New! OS/2 2.1 • Adobe's Acrobat • Super Lasers!

The Magazine for Business Computing Experts

August 1993

PC Computing

New WordPerfect vs. the Windows Stars

WAR of the WORDS

Our Usability Lab tested the best word processors. Only one came out on top. The winner will shock you.

SECRETS OF BUYING DIRECT

Incorporating *PC Sources*

Insider's Guide to The Top 40 Vendors

What You Want, When You Want It, Hassle Free

Windows at 150 MHz!
DEC's New Alpha PC

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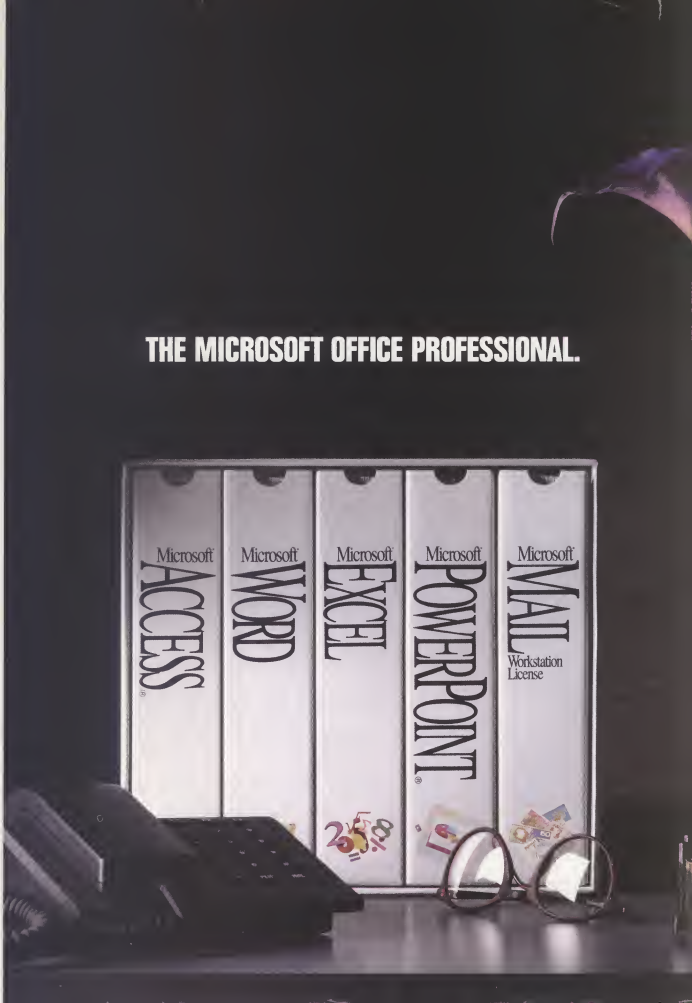
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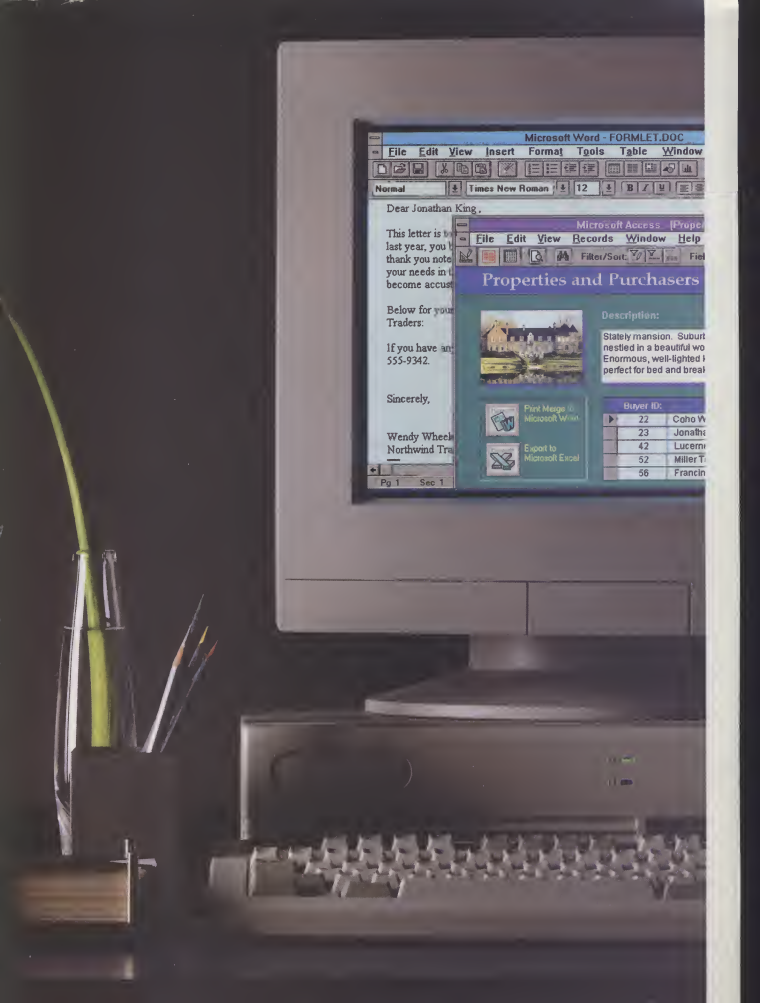
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File Edit View Insert Format Tools Table Window
Normal
Times New Roman
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Dear Jonathan King,
Microsoft Access
File Edit View Records Window Help
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(wait) your *(wait)* computer *(wait)*

does *(wait)* Windows, *(wait)*

have *(wait)* we *(wait)* got *(wait)* a

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PC Computing

108 War of the Words

RON WHITE AND KYLA K. CARLSON

When it comes to word processors, users are loyal to the point of fanaticism. So how do you decide it's time to move up to something new and wonderful like WordPerfect 6.0 or one of the top Windows heavyweights? *PC/Computing* explored those issues with the best office workhorses—gauging usability, features, and performance. Now you'll just have to convince your users that it's time to switch, rather than fight.

152 Super Printers

CYNDY BATES

Laser printers have moved to higher ground. Our usability and network performance tests on three of the top laser printers help you find the best printer for you—comparing speed, print quality, fonts and paper handling, ease of use and maintenance, and connectivity.

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180 Got Hardware Problems? We've Got Answers

SALLY NEUMAN

As soon as you add a board to your system, you've entered the nightmarish world of device conflicts. The more adapters and devices you use, the more likely it is you'll experience unpredictable file corruptions and system lockups. We help you track your system configuration and show you how to resolve device conflicts by following our airtight, eight-step process.

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Why is 35 percent of all hardware purchased through the direct channel? One word: *value.* Low prices, legendary tech support, and top quality make buying direct the smart way to shop. Our comprehensive guide gives you the lowdown on getting the best of everything—from prices to service and support. Plus: exclusive ratings of the top 40 direct sellers.

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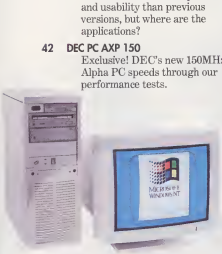

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intel inside

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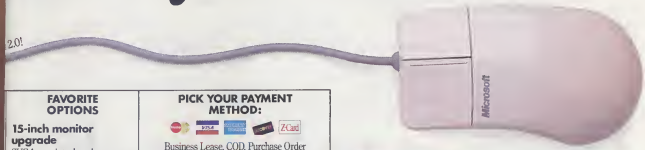

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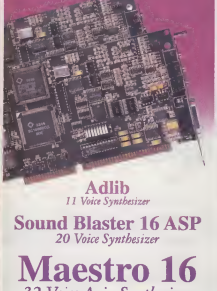

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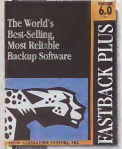

Then we invited 40 users – novices, propeller-heads, people who swear by Fastback, people who swear at it, and people who swear they've never seen it – to visit our offices and work with us personally.

During 30 days of interface design and usability testing, we ran up some hefty hotel bills. And learned some valuable lessons.

We learned, for example, that our installed base is nostalgic for the simple, straightforward, everything-available-at-a-glance interface we used way back in Version 2.0.

We learned that while some prefer to select files by typing in specs and others prefer to point and click, everyone wanted a choice.

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And while they were on the subject, our subjects insisted that restoring should be as simple and as effortless as possible.

They weren't kidding, either.

After they'd selected the file they wanted, they figured Fastback ought to tell them when it was backed up, what type of media it was backed up to and what type of backup it was.

"Anything else?" we asked.

"Sure," they said, and asked if Version 6.0 could do dishes and take out the trash.

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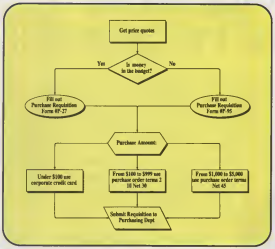

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Our reviews editor thinks I've been staring at a CRT too long. The editor-in-chief keeps reminding me how long it's been since I had a real vacation. And I swear I saw my assistant leafing through a straitjacket catalog just this morning.

They think I've lost my mind. All because I contend that Lotus—yes, Lotus—is building the best Windows applications in the business these days.

They remember 1-2-3 for Windows, Version 1.0—probably the slowest, clumsiest, least usable Windows shelfware of all time. It's been a steady uphill climb for Lotus since those dark days. But while we were looking away, Lotus raised the usability bar for Windows apps.

Ladies and gentlemen of the jury, I ask you to weigh the evidence before you tell me I'm crazy.

PHOTOGRAPH BY RICHARD KOMERSHEN

Exhibit A: Overnight Success

PC/Computing gave Lotus an MVP award last year for producing Freelance Graphics 2.0, a product that works the way we really work. Let's say you have a presentation due tomorrow at 9 a.m. You have the data you need, and you'll need 15 screens to tell your story. Even if you *install* the software after dinner, you'll still be done by 11 p.m. You get a full night's sleep, and your audience thinks you slaved for weeks.

Like the most patient Dale Carnegie instructor, Freelance walks you through the process of creating a presentation. Choose a SmartMaster. Click here. Type something. No nonsense, just results. It's perfect for people driven by deadlines.

Exhibit B: Ami Pro's High-IQ SmartIcons

Yes, I know, *everyone* has a bar full of buttons and icons. WordPerfect even named a promotional candy bar after its Button Bar. But the Lotus variety, pioneered in Ami Pro back before anyone took Windows seriously, is genuinely different and genuinely useful. Ami Pro won this month's word processing face-off (and a *PC/Computing* MVP award) on the strength of usability triumphs like this one. For starters, it's easy to customize: Contrast Ami Pro's drag-and-drop icon editing with Microsoft Word's take-a-deep-breath-and-dive-into-the-dialog-box approach. And it looks the same in every Lotus application.

Exhibit C: Working Together

You want a volume discount on software? That's the logic behind Microsoft Office and Lotus SmartSuite—you get a word processor *and* a spreadsheet *and* a presentation graphics program *and* an e-mail program . . . and maybe a toaster oven, too. Borland and WordPerfect even created a virtual company to sell Paradox, Quattro Pro, and WordPerfect for Windows in one big box.

But get this: When you buy Lotus's four-piece SmartSuite, the pieces really work together! To make speaker notes for a Freelance presentation, you slide back into Ami Pro for its industrial-strength editing tools. The point: There's more to a suite than cramming four boxes into a suitcase and cutting the price.

Exhibit D: Slickest Spreadsheet Interface

If you abandoned 1-2-3 in 1989, you'll be surprised by 1-2-3 Release 4.0 for Windows—and you'll wonder where they buried the bodies of the original programmers. The new 1-2-3 walks a tightrope, balancing between Windows interface conventions and usability-inspired features. It's not perfect, but there are innovations like these:

In-place editing. How would you feel if your word processor kept making you look 8 inches above the page? This 1-2-3 lets you edit where you expect to—right on the worksheet.

Cool cursors. Drag-and-drop editing is a great idea, but it can be hard to tell when you've grabbed the hunk of spreadsheet you want to move. The new 1-2-3 offers unmistakable feedback in the form of a dynamic cursor. When you reach the border, the cursor turns into a tiny hand; grab the edge of a block, and the hand turns into a fist wrapped around the border. It's cool *and* useful.

Active status bar. In a trick borrowed from Ami Pro, 1-2-3 uses almost the entire status bar along the bottom of the screen. Every region is live: Double-click on different patches to pop up formatting options, font lists, SmartIcon collections—even hotlinks to e-mail.

Smart dialog boxes. You've started a formatting operation, and while the dialog box is onscreen you realize you need to change the selected range. Don't back out and start over—instead, just click on the range-finder button to push the dialog box to the background, select a new range, and pick up where you left off.

Am I crazy to say that Lotus builds the best apps in the business?

Exhibit E: Lotus Notes

OK, so maybe I am crazy. I'm afraid to bring Lotus Notes near our Usability Lab for fear that testers will sue us for cruel and unusual punishment. Presumably, now that the 1-2-3 team has worked its magic, it will be free to kidnap the Notes developers and start all over again.

Still, Lotus keeps doing things right. The latest news: The company acquired Approach—the most usable Windows relational database ever. Think I'm crazy? Tell me why. Send your diagnoses to me at *PC/Computing*, 950 Tower Lane, 20th Floor, Foster City, CA 94404. We'll print the best replies. ◩

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- CPU: Intel 386SL
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- Memory: 2MB expandable to 10MB
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- Battery: NiMH; operating time up to 4 hours; a snap to remove
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- Power Management: Fully featured, including Deturba, Standby and Suspend to disk
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"...if you're looking for a subnotebook and want to make next to no compromises, then the $1495 ZEOS Contenda is your best bet."

—*PC Week*, February 1, 1993

"Take that, Gateway Handbook. ZEOS's Contenda...packs more power than would seem possible in 9.7-by-6.1-by-1.85-inch box. Introduced only months after Gateway 2000's popular Handbook, the Contenda is a generation ahead."

—*PC/Computing*, May 1993

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—*PC Sources*, May 1993

PC Week calls the ZEOS Contenda "the best yet of the new crop of lightweight, full-featured machines." We weren't satisfied with "best yet"—so we've made it *even better.* Because now you get your choice of a 386SL or 486SL CPU!

FEATURES THAT PULL NO PUNCHES.

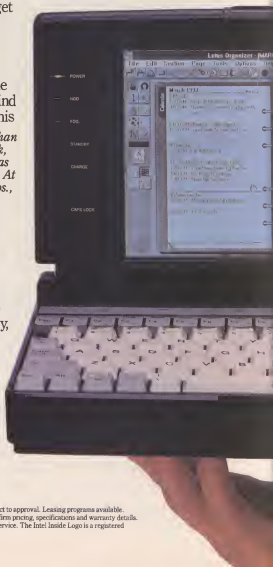
Start by checking out the 386SL. The specs are on the left. It's impossible to find a notebook on the market today that's this light, this small, this affordable—and still gives you *so much power.* But it's all here.

For instance, there's the smart SL processor. According to *PC Magazine*, when it comes to notebooks, look for Intel's SL processor. The ZEOS Contenda's CPU extends your battery life significantly—because it's intelligent enough to power-down the memory, disks, modem and more when they're not in use.

Smaller than a notebook, powerful as a desktop. At only 3.9 lbs., the ZEOS Contenda keeps you light on your feet.

intel inside

What's more, its features make it a pleasure to use. Such as a crisp, vibrant VGA backlit screen. A built-in track ball. Enough power and memory to easily run Windows. And at less than 4 pounds in weight, it's probably lighter than your briefcase!



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Contenda™: or 486SL CPU!

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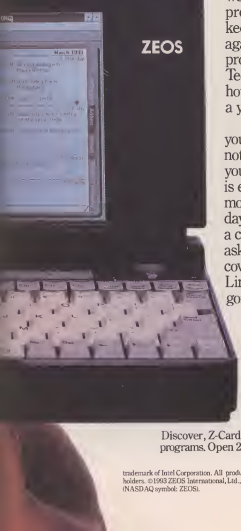
YOU GET CUSTOMER SUPPORT THAT'S THE BEST IN THE BUSINESS.



Our relationship with you doesn't end once we ship your Contenda. ZEOS pioneered comprehensive customer support, and it's what keeps our customers coming back again and again. We back all of our products with Toll-Free Technical Support, 24 hours a day, 365 days a year.

And we guarantee your satisfaction. If you're not absolutely convinced your new ZEOS Contenda is everything we say and more, you have a full 30 days to return it to us for a complete, no-questions-asked refund. Plus, you're covered by our One Year Limited Warranty and much more. You're going to be very satisfied. *We guarantee it!*

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- CPU: Intel 486SL operating at 3.3v
- Processor Speed: 25 MHz
- Intel's PI local bus for video acceleration!
- Memory: 4MB operating at 3.3v
- Hard Drive: 80MB
- Display: VGA backlit, 640x480, .23mm dot pitch, Sharp 7.4" diagonal, up to 64 shades of gray
- 512K video RAM
- Local bus video controller
- Battery: NiMH; operating time up to 5 hours with power management
- Size: 9.7" × 6.1"
- Weight: Only 3.9 lbs.
- Power Management: Fully featured, including Deturbo, Standby and Suspend to disk
- Keyboard: Comfortable 80-key with embedded numeric keypad
- I/O Ports: 1 serial and 1 parallel standard; ports for optional internal modem, external 3.5" floppy and external color VGA or SVGA monitor
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The ZEOS® Freestyle.

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THE BEST DISPLAY. GREAT VIDEO TOO.

Not only is the ZEOS Freestyle Notebook's screen big and easy to read, but the video is high-contrast and fast. Plus, there's the incredible tilt and swivel display—an industry first. You can swivel the screen left and right as well as tilt it up and down for the perfect viewing angle. It's the only notebook that can really be used while sitting in your lap!

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POWERFUL. AND INCREDIBLY PORTABLE.

Let's talk about power for a moment. Both Freestyle options include the smart and powerful Intel 25MHz SL CPU, memory up to 20MB and hard drive up to 180MB. The 486SL version also gives you a built-in math coprocessor and more advanced power management. Either one might well replace a desktop for many users. Plus, at only 5.6 lbs. with a built-in soft carrying handle, your ZEOS Freestyle is one of the most *portable* notebooks around!

Power!

NOW WITH 386SL OR 486SL CPU!

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Our relationship with you doesn't end once we ship your new Notebook. You can call us with your questions *24 hours a day, 365 days a year, and always toll-free.* Our customer support is the best in the business—and it makes for a lot of happy and loyal ZEOS customers.

What's more, if you're not convinced your new ZEOS Freestyle is everything we say it is and more, you have a full 30 days to return it to us for a complete refund—no questions asked. Plus, you're covered by our One Year Limited Warranty and much more. You're going to be very satisfied. We guarantee it!

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	#1	#2	#3	#1	#2	#3
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Intel 386SL CPU	■	■	■			
Intel 486SL CPU				■	■	■
25MHz Processor Speed	■	■	■	■	■	■
Memory (expandable to 20MB)	2MB	6MB	10MB	4MB	4MB	8MB
Hard drive (MB) (expandable to 180MB)	80MB	120MB	180MB	80MB	120MB	180MB
Uses 3.3v technology				■	■	■
3.5" 1.44MB floppy drive	■	■	■	■	■	■
VGA 10" backlit display; tilt/swivel base. 640x480, up to 64 shades of gray	■	■	■	■	■	■
Video RAM	256K	256K	256K	512K	512K	512K
Simultaneous video with external color monitor	■	■	■	■	■	■
NiCad battery; power up to 3 hours	■	■	■	■	■	■
Full power-saving features including built-in Suspend/Resume	■	■	■	■	■	■
81-key keyboard	■	■	■	■	■	■
Full-size inverted "T" arrow keys	■	■	■	■	■	■
Embedded numeric keypad	■	■	■	■	■	■
Easy-to-use built-in mouse key	■	■	■	■	■	■
Serial, parallel and SVGA ports; port for external keyboard or numeric keypad	■	■	■	■	■	■
Flash ROM for easy BIOS upgrades	■	■	■	■	■	■
DOS 6.0 with Enhanced Tools	■	■	■	■	■	■
Windows 3.1		■	■		■	■
Carrying case		■	■		■	■
Extra battery			■			■
External charging stand			■			■
Internal 9600/2400 baud send/receive fax modem			■			■
24-Hour Toll-Free Technical Support	■	■	■	■	■	■
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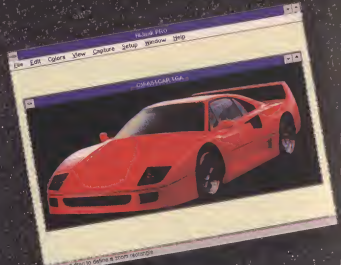

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Everyone at Inset Systems was proud when PC Magazine called HiJaak for Windows 1.0 "the Mercedes of image conversion utilities" (10/13/92) and awarded it Editors Choice (4/13/93), but we weren't satisfied.

So we improved upon the product that Windows User called, "...king of the Windows file conversion hill" (10/92). And now, if you work with Windows and graphics, your biggest problem will be deciding which new HiJaak PRO features are most useful to you.

"Converts more formats"

With over 70 formats supported, you can use virtually any image anywhere. No more headaches and missed deadlines because of file format problems.

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The Vices and Virtues Of MS-DOS

Computers and crowded landfills, "green" gullibility, and a date for Penn

DOS Done Right

My compliments to you on the May issue. The articles on DOS and the Pentium ("DOS 6.0," page 128, and "Will the Pentium Kill the 486?" page 116) were by far the best I've seen.

The article on DOS mirrored my own evaluation that the upgrade only added utilities and neglected to enhance the operating system. When I read articles about DOS 6.0 in other publications, I wondered why they failed to mention that other utilities on the market perform the same functions better. *PC/Computing* provided a real service to its readers.

JACK ALLEN
PACIFIC PALISADES, CALIFORNIA

Your review of MS-DOS 6.0 is an insult to those of us who already acquired most of the "virtues" of MS-DOS 6.0 in Digital Research's DR DOS, as well as in other third-party utilities. To wit:

1. MS-DOS 6.0's Interlnk, DoubleSpace, and DEFRAG utilities debuted in DR DOS 6.0 as FileLink, the SuperStor compression utility, and DiskOpt, respectively.

2. MS-DOS 6.0's multiple-choice startup capability has been around since DR DOS 5.0, released in 1990.

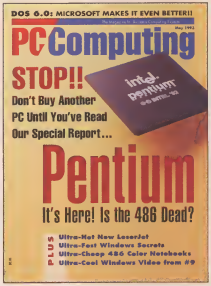
3. MS-DOS 6.0's MOVE command is available in a COMMAND.COM replacement package called 4DOS.

In short, many of the "new" features in MS-DOS 6.0 have long been available in other software packages. You would do your readership a great service by taking your heads out of the sand and giving equal time to products that compete with—and are sometimes superior to—Microsoft products.

KEN SIMMONS
AUBURN, WASHINGTON

I'm surprised that so much emphasis is still placed on souping up old operating systems. With system components becoming so inexpensive and with people willing to spend hours fiddling with their CONFIG.SYS and AUTOEXEC.BAT files, wouldn't it be better to move to an operating system that addresses the inadequacies of DOS and Windows and allows users to operate programs without worrying about precious memory?

I use OS/2 2.0, and I can load and run



DOS and Windows programs just fine. I don't have to tweak CONFIG.SYS or AUTOEXEC.BAT, and I've never run out of memory for a DOS program. Once OS/2 is up and running, it's snappy. I'll admit I have lots of memory and a fast hard drive, but memory is cheap and a 200MB hard drive costs only about $400.

I'm surprised people have stuck with DOS this long. Perhaps they don't know about OS/2 or are just afraid of it: It *is* a different environment, but it offers rewards to those who persevere.

TIMOTHY PETER CHANT
PORT COQUITLAM, CANADA

Post on the Pentium

Did I miss an important announcement from Redmond? Your article about Intel's Pentium ("Will the Pentium Kill the 486?" May, page 116) states, "It wasn't until recently that 32-bit PC operating systems such as OS/2 and Windows NT finally turned up."

I don't think it's fair to imply that Windows NT is equivalent to OS/2 when it hasn't been released yet. It may turn out to be as good as or better than OS/2, but until it is released and reviewed, you shouldn't treat it as a viable alternative to a product that has had to face the slings and arrows of the press and the marketplace.

LEON TAYLOR
BEAVERTON, OREGON

According to the sidebar to your article on Intel's Pentium ("Cooling Down a Hot Chip," page 125), Intel recalled the chips that drove 486/50 systems early on because of reliability problems. I recently upgraded my 386SX to a 486/50. The repairperson who performed the upgrade didn't mention any problems with 486/50 chips. Have I installed a faulty system, or have the problems with the 486/50 been corrected?

DANIEL B. HAWKINS
FAIRBANKS, ALASKA

First-generation 486/50 systems had problems, but they were addressed long ago. We've tested countless 486/50s in our labs, and we've found the machines to be perfectly reliable and fast.

—Sebastian Rupley

I thought something didn't look right when I compared the pictures of the 486 and Pentium chips on page 118 of the May issue, so I took out my trusty Intel key chain, which has both a 386 and a 486 chip embedded inside. The 486 is much larger than your "actual size" photo—it's really about ⅔ the size of the Pentium.

JIM HORN
FREMONT, OHIO

A Path Less Traveled

In "This Old PS/2" (May, page 192), you implied that there are only three ways to increase hard drive capacity in a PS/2: use a Micro Channel-to-SCSI hard drive, a Micro Channel-to-IDE hard drive, or a Micro Channel hard drive card.

I believe that the best alternative is to attach a parallel port hard drive. The advantages are numerous: It can be attached to different machines, including laptops; it can be daisy-chained in case your computer needs more capacity in the future; and you can attach the drive to a new computer if you replace the PS/2 with a more powerful machine. A parallel port hard drive is also easy to install and set up, and it's reasonably priced.

GEORGE YAO
EAST ELMHURST, NEW YORK

"This Old PS/2" was very informative. Considering that obsolete computers are piling up in our national landfills every day, I was amazed to find anyone willing to write about recycling them.

JOHN B. CUNDIFF, JR.
MILLERSVILLE, MARYLAND

How to Make a Mint

I gathered from your May Dvorak vs. Somerson column ("Is $99 Software Just a Fluke or Are Rock-Bottom Prices Here to Stay?" page 108) that with a little financial help from Paul Somerson, I could become as rich as Bill Gates.

Paul states that the giant software companies will "slowly grind everyone else into dust" by selling software at fire-sale prices. He warns us to "get it while you can, folks. Once the buy-outs and belly-ups are history, the few companies left will try to charge whatever they can get."

Well, Paul, lend me some of your cash so that I can buy all the software products these giants are willing to sell me at these rock-bottom prices. Then, when all the buy-outs and belly-ups have taken place, I—excuse me, I mean *we*—will make a mint reselling the products at cut-rate prices.

C'mon, guys. Get a handle on the benefits of the free-enterprise system.

PAUL M. FENECH
AUSTIN, TEXAS

Dvorak Packs a Punch

John C. Dvorak's May column ("Forget Politically Correct Packaging—Give Us Functional Software!" page 100) is commendable in many respects. "Green" gullibility is typically based on a little

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truth and a lot of misinformation.

Unfortunately, Dvorak also managed to include a number of cheap shots at packaging in general, demonstrating his ignorance of its functional value in a distribution business. Packaging provides product protection, security, and theft deterrence, as well as promotional marketing. I suggest that if he is compelled to write negatively about packaging again, he should research how packaging has appreciably improved his life.

R. P. FINCHER
WESTPORT, CONNECTICUT

Dvorak's May commentary struck a chord, not so much about the "green" revolution, but about creeping feature complexity. I believe software designers fail to understand customers' fundamental wants and needs, and are more concerned with demonstrating smartness and one-upmanship.

JOHN M. SULLIVAN
AUSTIN, TEXAS

Penn's Potential Girlfriend

Just finished Penn Jillette's May column ("More Bandwidth Equals Entertainment," page 324). I took his point to be that nobody needs two-way computer/TVs when you (and everybody else) has a phone. I just ended a couple of pen-pal relationships that were carried on through e-mail on Prodigy. Very clunky. It's much easier and more satisfying to just phone (or even, heaven forbid, write a letter).

Say, Penn, I don't know if you really have a girlfriend in Florida, but if you want one, call me and we can go get some pizza.

CYNTHIA STUMP SWANSON
GAINESVILLE, FLORIDA

In Defense of DOS

In Ed Bott's May column "Wanted: More Than Just Another Upgrade to Good Ol' DOS" (page 22), he pondered the elements of an ideal operating system and solicited readers' well-reasoned arguments in defense of Microsoft's DOS. We received dozens of responses. Here's a sampling.

You say you've never met anyone who truly objects to a graphical user interface? Well, I loathe GUIs. My ideal operating system must have a character-driven command line as its native operating mode. A graphical shell utility may be an add-on, but you shouldn't have to mouse through it to get to the command line whenever you boot.

LOUIS EPSTEIN
VIA PC/CONTACT

You have now corresponded with—if not met—someone who truly objects to a graphical user interface.

GUI and Apple computers are great for those who spend a lot of time in graphics programs, who don't know how to type, and who like silly little icons that are more difficult to decipher than any subdirectory name.

Introducing the Coactive, Do-It-Yourself Network.

Now—in less than 5 minutes—you can connect your computer to a network.

Without sweating through a complex installation process.

Without even opening your PC.

All it takes is the new Coactive Connector. Just plug one Connector into each of your PCs and you're networked.

With the revolutionary Coactive Connector, installing a PC network is as easy as snapping in a phone card.

Unlike other inexpensive solutions, a Coactive network gives you the file-and printer-sharing power of a real network. Without draining your PCs' RAM. The secret is a 32-bit microprocessor inside each Connector that handles all the networking tasks—freeing up your PCs to concentrate on your real work.

And since Coactive is based on industry-standard technology, you're not locked into a proprietary hardware system.

IN 5 MINUTES WE CAN CHANGE ALL THAT.

In fact, you can even connect an old PC AT running DOS to a 486 screamer running Windows. And link both of them to a Macintosh.

Everything you need is in the box—hardware, software, cabling—at a cost of only about $149 per PC.

There's nothing new to learn. You'll use familiar computer commands like "copy" or "drag and drop" to use the network.

And you won't have to become a "network administrator." Because our CoAssistant software does the network diagnosis and troubleshooting for you.

Plus, don't forget that a Coactive Connector is so easy to install that we guarantee you can do it in 5 minutes* Or your money back.

So, if you've got from 2 to 32 PCs to connect, visit your favorite dealer today. Or call 1-800-825-2NET (800-825-2638) and ask for extension 101 to order direct.

If you think networking has to be complex and costly, give us five minutes. And we'll give you a network. Guaranteed.

COACTIVE

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Circle 101 on reader service card.

Personally, I find the changes in DOS 6.0 to be welcome improvements.

EILEEN S. GITHENS
COLUMBIA, SOUTH CAROLINA

Please don't send all of us to graphical user interfaces. I hate them.

Certainly, the DOS screen is daunting. It is cold and uncooperative. That, I am sure, is why Windows is so popular. It's like seeing spring flowers after weeks of overcast weather and old, dirty, melting snow.

But there is a better answer, namely a utility called Wonder Plus. It makes computer life easy. For DOS aficionados, the command line is ready and waiting with visuals (many of which are customizable) that take you swiftly to where you wish to go in your applications.

D. B. CAMERON
MIDDLEBURG HEIGHTS, OHIO

I cling to the notion that our tools should be suited to our tasks. In my case, that means keeping the books and records of a small business, maintaining my personal financial records, and performing secretarial duties. Several products perfectly suit my needs, including MS-DOS 3.3, Quicken 5.0, QuickPay 2.0, Andrew Tobias' TaxCut, and old versions of Microsoft Word, dBASE, and Lotus 1-2-3, all driven by a neat DOS shell called QuickMenu. When housekeeping chores are called for, old versions of XTree and Norton Utilities keep files and the 20MB hard drive on my 8088 computer tidy.

J. ROBERT WEBB
BRANFORD, CONNECTICUT

If you're so impressed by MS-DOS, why weren't you impressed enough by DR DOS 6.0 more than a year ago to make that upgrade? There is virtually nothing in the new and glorious MS-DOS 6.0 that DR DOS 6.0 doesn't offer.

As for your ideal operating system, you might benefit by considering an offering that doesn't begin with *Microsoft*. Consider GeoWorks. Its most acclaimed virtues are its speed and its extremely logical Motif-compliant interface. It supports 32-character filenames and fully supports file-application association. Running with DR DOS 6.0, GeoWorks provides a secure and fault-tolerant operating system. If you crash in GeoWorks, just warm- or cold-boot, and the system comes back right where you left off. And regarding hardware independence, GeoWorks 2.0 can run on Tandy/Casio's handheld Zoomer machine, as well as on 8088s through Pentium desktop, laptop, and notebook computers.

I agree that MS-DOS won't disappear overnight and that we'll need it for compatibility purposes. However, none of the best ways to interface with an operating system start with *Microsoft*.

RAY WASHINGTON
LAKE BARRINGTON, ILLINOIS

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1991, 1990

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Letters

dows, GeoWorks, Desqview, or Apple's System 7. The evolution of software is governed not only by advancing hardware technology and programming environments, but also by stubborn software developers who refuse to make their products compatible with those of other developers. Users can only hope that operating systems of the future will be designed by people who are more concerned with doing the job right than with screwing competitors out of a piece of the pie. If you want a cross-platform operating system that does it all, you'll just have to wait for the software developers to evolve.

SARI SCHIMEK AND MARIO BRUNO
NEW YORK, NEW YORK

DOS does have flaws, but it's much better than Windows. I object to GUIs for one simple reason: I don't have three hands—two for the keyboard and one for the mouse. Most computer columnists must have three hands, or we would see less coverage of Windows.

JOHN R. NACHREINER
REDONDO BEACH, CALIFORNIA

As you said, in its day, DOS was "pretty hot stuff. It was simple, small, and eminently hackable." So it's a little bigger now. So what? It's still quite hackable.

With minimal effort, I have started a seventh- and an eighth-grader down the DOS path. In four months of banging around and experimenting, they have taught themselves to navigate the old machine. If a couple of kids can teach themselves DOS, learn to write batch files and macros, and become so casual about it that they don't fear crashing the system, then surely this is not an operating system to be despised.

JIM GARDNER
ADDRESS WITHHELD

Ed, Ed, Ed—your narcissism is apparent after reading your diatribe against MS-DOS. Not all computer aficionados are techno-nerds who crave new, aggrandized, and eclectic GUI operating systems powerful enough to run a multiprocessed Cray.

I dislike Windows and other GUIs because of the numerous mouse clicks needed to open a file. DOS lets me manipulate data easily. It may not have all the bells and whistles that *you* need, but you don't represent all computer users out there.

ROBERT T. BURROW
TOPEKA, KANSAS

I was surprised that you failed to mention one operating system that contains most of the features on your wish list: AmigaDOS 3.0. AmigaDOS has a logical GUI with a command-line shell and a great file system that handles long filenames. It automatically configures add-on cards and is extremely crash tolerant.

I'm not saying that Amiga is the best computer out there and that everyone should trash their IBM compatibles. I just wonder why you didn't even mention AmigaDOS when considering operating systems that could serve as models for creating the ultimate system.

PEDRO AGUIAR
FALL RIVER, MASSACHUSETTS

Until a better operating system comes along, I'll cherish "good ol' DOS."

On the office computer I have MS-DOS 5.0, XTree 2.5, EZ DOS, PKzip, QEMM-386, and some other utilities that make my computer sessions less frustrating. It seems I'm the only one in the office who knows how to input commands at the DOS prompt instead of using a mouse pointer on a Windows screen.

GERALD J. HUGHEY
NEWARK, NEW JERSEY

I believe that well into the 22nd century, people will still need to create batch files to perform small tasks. Instead of clicking through different icons and windows to copy or delete a file, why not just type it in at the command prompt?

I say improve DOS; don't replace it. Sure, it has some shortcomings, but that's why we have upgrades.

CHARLES V. MARTIN, JR.
HOLLY SPRINGS, MISSISSIPPI

Mail your thoughts to Letters, PC/Computing, *950 Tower Lane, 20th Floor, Foster City, CA 94404; fax us at (415) 578-7029; or contact us via MCI Mail at PCCEditorial or via PC/Contact, our online forum. Letters must be signed and must include a daytime phone number. All letters become the property of* PC/Computing *and will be edited for length and clarity.*

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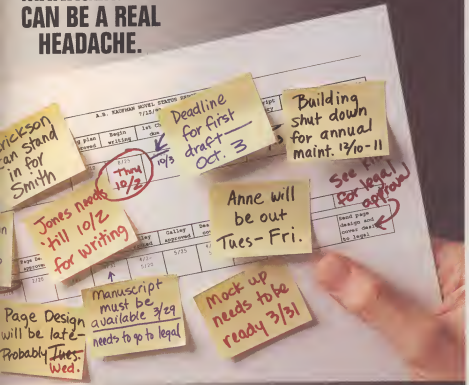
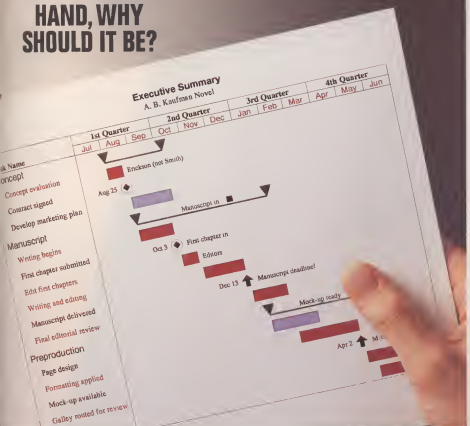


ON THE OTHER HAND, WHY SHOULD IT BE?



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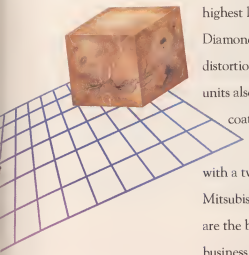

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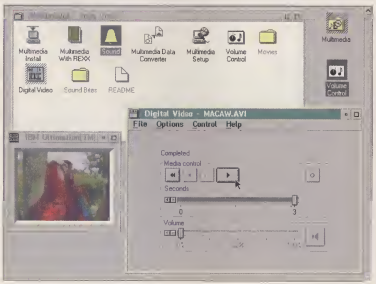
New!

IBM SWIMS AGAINST THE WINDOWS TIDE . . .

OS/2: It's Top Technology,

SLICK MULTIMEDIA
Multimedia macaw anyone? Our feathered friend here appears in a digital video clip running at 30 frames per second. OS/2 2.1 also features built-in support for sound boards, such as Creative Labs' Sound Blaster, and other whizzy utilities like those seen at the top of the screen here.



WHILE OTHER 32-BIT operating systems are struggling just to make it to the desktop, OS/2 is all grown up. With Version 2.1, OS/2 (a *PC/Computing* 1992 MVP winner) is not just powerful but also incredibly usable. Big Blue's operating system is the technology leader, but OS/2 applications remain as scarce as flies at a frog convention. And there's the rub. OS/2 remains the operating system most business buyers are *almost* ready to upgrade to.

The best news about Version 2.1 is its uncompromising support for Windows 3.1 applications and popular peripherals—specifically CD-ROM players and a longer list of printers. IBM has also finally acknowledged that there are graphics standards other than XGA. OS/2 2.1 has new drivers for Super VGA, handling up to 256 colors at 1,024-by-768-pixel resolution. Another surprise: OS/2 now comes with IBM's slick Multimedia Presentation Manager/2 (MMPM/2), making the operating system a powerful multimedia engine.

Apart from these high-profile additions, though, most of the changes to OS/2 are under-the-hood updates and fixes. Users of Version 2.0 will find that the update looks and operates much the same. Version 2.1 adds 32-bit versions of the Graphics Engine and High-Performance File System (HPFS), making this a complete 32-bit, multitasking, multithreading operating system. The object-oriented WorkPlace Shell, which represents files, directories, peripherals, and applications by icons and folders, is still the technological centerpiece of OS/2 and hasn't changed a bit.

Like Version 2.0, 2.1 is flexible to a fault. Every object on the OS/2 desktop is reconfigurable, and the number of options can be overwhelming: There are 51 settings for each DOS session and 54 for each Win-OS/2 session. Once you master the settings, there's plenty of power to be had. You can selectively install device drivers and customize AUTOEXEC files for individual DOS and Windows sessions.

"... Insert Disk 17"

Installing Version 2.1 on a new machine is painless—as long as you don't mind swapping disks. Adding support for Windows 3.1, the

Under the Hood: Reasons

IBM adds most missing pieces.

WINDOWS 3.1 APPLICATIONS now run on OS/2. This will keep OS/2 compatible with most Windows applications for at least the next couple of years.

WINDOWS ENHANCED MODE SUPPORT lets you run Standard mode applications and Enhanced mode applications at the same time. OS/2's Windows compatibility is not perfect, however: The OS won't run Windows apps that use VxD, Windows' virtual-device drivers.

WINDOWS ACCESSORY APPLICATIONS are now bundled in OS/2 2.1. Popular selections include Calendar, Media Player, Notepad, and Paintbrush. Version 2.1 also comes with the latest version of Windows' File Manager.

FLASH!
DEC'S ALPHA BENCHMARKED
(SEE PAGE 42)

But Where Are the Apps?

Windows accessories, and Multimedia Presentation Manager/2 has upped OS/2 2.1's disk count to a whopping 25. The good news is that Version 2.1 is available on CD-ROM.

OS/2 2.1's disk proliferation also soaks up more hard disk space. You'll need between 18MB and 31MB of disk space, depending on which OS/2 features you select. When we upgraded our Gateway 2000 system from Version 2.0 to 2.1, we used an additional 8MB of disk space.

IBM earns a Wishful Thinking Award for continuing to specify an 386SX with 4MB of RAM as OS/2's minimum hardware requirements. We tried a 33MHz 386DX Gateway 2000 with 4MB of RAM, and OS/2 did what it has always done with inadequate memory: It ran excruciatingly slowly. Every time we opened or closed a window or application, the operating system slowed to a crawl while it spooled code between memory and disk. We then upped our system RAM to 8MB, which is the accurate minimum. With 16MB of RAM, performance was impressively fast.

Upgrading from OS/2 2.0 to 2.1 on our test system wasn't flawless, however. Most of the problems that cropped up involved Windows applications and OS/2's many configuration settings. In some cases, icons no longer connected to the applications they represented. In other cases, existing Windows applications were simply not loaded. And on one occasion, Win-OS/2 stopped working altogether. In most cases, we repaired the damage by rerunning OS/2's Selective Install application, but the process was tedious.

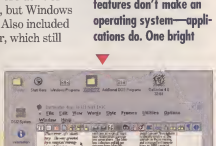
It's the Real Thing

Along with Version 2.1 you get Windows 3.1—not just an emulator but the original code, thanks to the cross-licensing deal between IBM and Microsoft. OS/2 2.1 not only runs Windows 3.1 applications, but it also includes the full complement of Windows accessories, including the Calculator, Notepad, Paintbrush, and Sound Recorder. Many of these utilities are duplicated by OS/2's applets, but Windows users will appreciate the choice. Also included is the Windows 3.1 File Manager, which still provides a faster way to move files around than OS/2's drive icons.

More good news for (*continued on page 39*)

STILL NO APPS

DeScribe, below, is one of the few big-time apps currently available for OS/2. And there you have OS/2's recurring problem—there just aren't enough sexy apps to complement the operating system's superior technology. In the end, features don't make an operating system—applications do. One bright spot: Lotus has several of its best apps out in OS versions, including Freelance, Ami Pro, and 1-2-3. Even there, though, the OS/2 versions are missing significant extras found in the Windows versions.



We Like the New OS/2

A 32-BIT GRAPHICS ENGINE is now built into OS/2, rather than bolted on as it was in updated releases of Version 2.0. New 32-bit display device drivers let you run draw, paint, and multimedia applications that support 256 colors and 1,024-by-768-pixel resolution.

PICKING YOUR FAVORITE FONT is easier because OS/2 Version 2.1 has both Adobe Type Manager Level 2.5 and Microsoft TrueType fonts.

OVER 250 PRINTER DRIVERS now come with OS/2, including ones for PostScript and Hewlett-Packard's latest LaserJet and DeskJet printers.

CD-ROM INSTALLATION is part of Version 2.1's new built-in CD-ROM support. Setting up OS/2 from a CD is a lot easier than shoving 25 high-density floppies into your PC. The operating system has drivers far more than a half-dozen leading CD-ROM drive vendors.

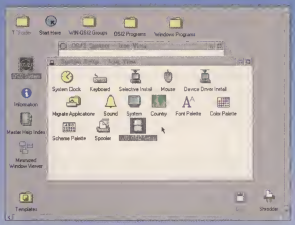
IBM'S MULTIMEDIA PRESENTATION MANAGER/2, now bundled with Version 2.1, lets you run digital motion video at 30 frames per second and supports sound boards, such as Creative Labs' popular Sound Blaster.

PCMCIA AND ADVANCED POWER MANAGEMENT SUPPORT makes OS/2 friendlier to portable PCs. If the PCMCIA card has the proper OS/2 drivers, you can insert or remove it without shutting down OS/2 or the notebook.

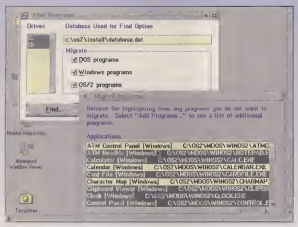
New!

OS/2 Smooths Rough Edges, Gets More Diplomatic, Efficient, Flexible

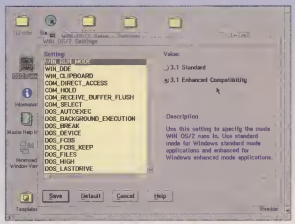
1. OS/2's exceptional flexibility is illustrated in its setup windows. Every OS/2 desktop object, even Windows applications, has its own pop-up settings window, giving you lots of control over how the object looks and behaves.



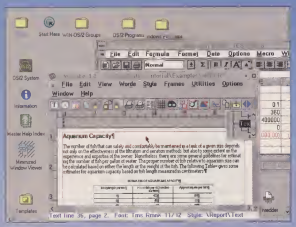
2. Many of the improvements found in Version 2.1 are not immediately obvious. Most of the icons will look familiar, but they have improved features, such as support for sound, high-resolution graphics, and 256 colors.



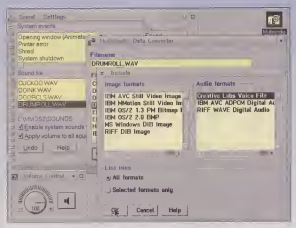
3. OS/2's union with Windows is far from perfect. When you add a Windows application to your system, you still have to run OS/2's superfectious Migrate utility if you want the application to appear as an object on the desktop.



4. Living with DOS is not always easy for an advanced operating system. The Win-OS/2 settings options are enough to intimidate all but the most hardcore DOS user. It's easy to select Enhanced or Standard Windows mode, however.



5. Support for Windows 3.1 apps is a definite improvement for OS/2. Still, if you use a native OS/2 app like DeScribe and a Windows app like Excel, you'll notice the slower performance on the part of the Windows app.



6. MMPM/2—OS/2's Multimedia Presentation Manager—supports a wide array of audio and video formats, and it has a nicer interface. The volume control at the lower left is an example of the whizzy new interface extras.

OS/2, *from page 37*

Windows users: OS/2 now supports Windows Enhanced mode. Some Windows apps run better in Enhanced mode, and others require it. We installed Lotus Improv, which requires Windows 3.1 and Enhanced mode, and it ran perfectly.

As with Version 2.0, OS/2 2.1 lets you run Windows applications in their own seamless windows on the OS/2 desktop or in full-screen mode. When you choose the latter, the screen looks just like home to any Windows 3.1 user—accessories and all. You access the OS/2 desktop through an icon in the corner of the Win-OS/2 Program Manager.

The Stopwatch Says . . .

Thanks to the new 32-bit code, OS/2 2.1 itself is much snappier. And upgrading doesn't mean sacrificing application performance. We put Microsoft Excel and Word for Windows through a few simple paces in Windows and in both versions of OS/2. With Word for Windows, we timed a search-and-replace operation, and scrolled through a 10-page document. For Excel, we ran a macro that repeatedly looked up values and calculated mortgage payments as interest rates changed.

Word for Windows took the same amount of time no matter which track we ran on—Windows, OS/2 2.0, or OS/2 2.1. Excel was definitely fastest under Windows, but it ran at about the same speed with either version of OS/2. It was the same story loading Excel—faster with Windows but about the same with OS/2 2.0 and 2.1.

For a final test, we installed DeScribe, a 32-bit OS/2 word processor, and ran the same tests used for Word for Windows. Here again, there was no difference in performance between OS/2 2.0 and 2.1.

The Bottom Line

What's missing? OS/2's lack of built-in networking remains one big sore point. The operating system coexists well with NetWare, but it has no peer-to-peer features or other network management goodies of its own. This is one area where IBM is not keeping up, especially given the powerful connectivity features in Windows NT (see the July issue).

IBM's operating system grows more impressive by the minute. Version 2.1 lists for $225, and IBM is offering upgrade discounts for a limited time. Should you move to OS/2 from Windows? If you weren't seduced by OS/2 2.0's power, this version doesn't offer any major reason to switch. And until a flood of mainstream business applications materializes, Windows remains the safe haven for applications.

If you're already using OS/2 2.0, should you upgrade? Absolutely—especially if you use Windows applications under OS/2. For upgraders, the new OS/2 is a must-have product.

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Exclusive! DEC's 150MHz Alpha Roars Past Mere Mortal PCs

PENTIUM KILLER?
Believe it. Our tests show DEC's Alpha to be lightning fast. The test system had 32MB of RAM, an internal 8K data and instruction cache, a 512K secondary cache, a 1GB hard disk, Compaq's QVision video adapter, six EISA slots (four available), and a prerelease version of Windows NT.

What does it cost? The DEC PC AXP 150 ships to developers with 16MB of RAM, a 14-inch Super VGA monitor, a 245MB SCSI hard drive, a 3½-inch floppy, a mouse, and a keyboard for $6,795. Compaq's QVision Super VGA video adapter (with 1,024-by-768-pixel resolution) and a preinstalled version of Windows NT are included.

DREAMING OF WINDOWS at 150MHz? Tired of waiting for Windows to open and applications to load? We scrambled to get our hands on Digital Equipment Corporation's new 150MHz PC AXP running an early port of Windows NT, and it's a rocket (see chart). But even though the Alpha beat our fastest 486/66 and new Pentium systems in all speed tests except a floating-point-intensive test, the jury will stay out until Windows NT for Alpha is released and optimized, 32-bit applications become available for both Alpha and Pentium chips.

At the heart of DEC's PC AXP is its new 150MHz, 64-bit Alpha RISC microprocessor. Billed by some as DEC's last hope for revival, the Alpha is slated for duty in DEC's new line of AXP PCs and will be offered to OEMs as well. Among the offerings in the works: DEC has already signed a deal with Cray and Kubota for new supercomputers incorporating multiple Alphas; and on the PC side, Olivetti and Carrera plan Alpha PCs.

According to DEC, the Alpha is designed for users whose bread-and-butter applications will be 32 bit, but who still use 16-bit DOS and Windows applications. The real measure of the Alpha's success will be in the explosive PC market, where DEC has partnered with Microsoft to port NT to the Alpha architecture.

The core of the Alpha (which has 1.7 million transistors) is its pure RISC design, including superpipelining and superscalar features. Intel's new Pentium (which has 3.1 million transistors) is also a superscalar processor, but it combines CISC and RISC architectures. *Superpipelining* allows each instruction to be divided into small pieces, and the pieces from several instructions to be executed simultaneously. *Superscalar* architecture means a processor can execute instructions using more than one pipeline at a time.

A major difference between RISC and CISC processors is that RISC processors have a smaller, simpler instruction set and require up to five times as many instructions as CISC processors to do the same task. However, RISC processors such as the Alpha can execute those instructions in a fraction of the time it takes a CISC processor such as the Pentium.

Controlling Pentium's heat has been a consistent challenge for Intel, and this issue surfaces in most discussions of the chip. The Alpha design includes smart cooling features: Embedded in the Alpha are metal rods that attach directly to the supplied heat sink and draw heat out automatically.

DEC is offering both Pentium and Alpha systems running NT, and expects to sell about one Alpha system for every nine Pentium machines. A basically configured Alpha system will cost under $7,000–in the same ballpark as first-generation Pentium machines.

Finished, optimized software will usher in the verdict on DEC's Alpha, but our early tests proved one thing for certain: Watch your applications fly by at 150MHz, and you'll never be the same. **ADAM MEYERSON**

DEC PC AXP 150, $6,795 • DIGITAL EQUIPMENT CORP. • (508) 897-5111

PC/COMPUTING LAB REPORT:

THE ALPHA SYSTEM'S ADVANTAGE: BLISTERING PROCESSOR POWER

These tests are designed for 32-bit operating systems like Windows NT. Longer bars represent better performance relative to the Compaq 5/60M 486/33.

Product	Processor test	Floating-point test	Graphics test	Disk test
DEC PC AXP 150 (Alpha)	206% Faster	217% Faster	110% Faster	300% Faster
Compaq 5/60M (Pentium)	162% Faster	264% Faster	90% Faster	275% Faster
Compaq 5/60M 486DX2/66	90% Faster	102% Faster	70% Faster	140% Faster
Compaq 5/60M 486/33	Baseline	Baseline	Baseline	Baseline

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DTP Usability Champ: Publisher Now Has a 21st-Century Interface

QUICK FACE-LIFTS

One dick ond you're there. PogeWizords remoin Publisher's sexiest feoture. Click on the program's PogeWizard tool to coll up document styles

ond clip ort (above). The Business Solution Set generotes letterhead and business cards with ponoche. You con choose o Jozzy or o Traditional look. You con also choose from golleries of newsletter and brodure styles (see below).

You'll oppreciote this degree of outomotion if

you've used PogeMoker, QuorkXpress, or FrameMoker. While those progroms remoin the most powerful DTP tools, they're not nearly os usoble os Publisher.

DESKTOP PUBLISHING NEEDS a breath of fresh air, and it's here. Microsoft Publisher 2.0 takes desktop publishing a quantum leap forward. Does that mean the big guns—PageMaker, QuarkXpress, and FrameMaker—are threatened? Not a chance. Those products, which are much more expensive, put more powerful tools in the hands of graphics professionals than Publisher can—but that's not the point. Publisher strikes the following deal with you: You supply text and graphics, and it makes design and layout decisions. After handing test documents over to Publisher and watching them get automatic face-lifts, we're convinced that this is the desktop publishing program for the masses.

PageWizards, introduced in Publisher 1.0, are much more plentiful in the new version. Like the ChartWizard in Microsoft Excel, PageWizards present you with galleries of finished products—such as newsletters, business forms, brochures, banners, and even envelopes. Just click on the sample you like, and your dull-looking document takes on its look. This approach contrasts sharply with high-end desktop publishing products such as PageMaker and QuarkXpress, which expect you to build documents piece by tedious piece. When you want to change the look of anything on a Publisher page, just click the right mouse button and a shortcut menu will appear. If you run into any confusion, you can pull up Cue Cards—like those in Microsoft Access—which provide step-by-step explanations of how to complete tasks.

Publisher 2.0's PageWizards do more than simply construct custom documents—they also automatically build custom page elements, such as newsletter banners, logos, ads, coupons, and calendars. Click on the PageWizard tool on Publisher's toolbar, choose an element, drag the mouse to create a frame, and click on OK. We found this process effortless, but we were disappointed by the small selection of page element styles.

Also, although there is more clip art in Version 2.0 than in Version 1.0, too much of the clip art looks primitive. Case in point: A two-dimensional reindeer, drawn in four or five hasty strokes, that would look more appropriate on the wall of a cave than in a newsletter.

On the other hand, there is a complete gallery of formatted borders you can use to frame text and graphics, and we were wowed by Publisher's WordArt module. WordArt could be a standalone program—it lets you point and click to apply special three-dimensional effects, including lighting effects and text on a curve, to text. We loved it.

In addition to improving the interface, Microsoft has done away with some of the glaring shortcomings of the first version. Version 1.0 couldn't automatically wrap text around graphic objects and had bad typography (see below), but 2.0 does these things perfectly.

High-end DTP programs like PageMaker and QuarkXpress are much more appropriate for professional graphics than Publisher is, but they're nowhere near as usable. Our dream DTP program has PageMaker's high-end features and Publisher's usability. Publisher still won't cut into the professional graphics market dominated by expensive, high-end products, but at $199 it's the best buy for everyone else.

SEBASTIAN RUPLEY

PUBLISHER 2.0, $199 • MICROSOFT CORP. • (800) 426-9400

NO MORE RANSOM-NOTE TYPOGRAPHY

Publisher 1.0's typography—one of the product's most pressing problems—was inflexible. As these examples show, Version 2.0's ability to hyphenate means text is much more intelligently placed.

FROM RANSOM NOTE . . .	TO JUST RIGHT
people or any other generation. The energy, the faith, the devotion which we bring to this endeavor will light our country and all who serve it, and the glow from that fire can truly light the world.	people or any other generation. The energy, the faith, the devotion which we bring to this endeavor will light our country and all who serve it, and the glow from that fire can truly light the world.
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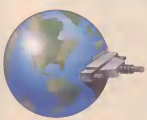

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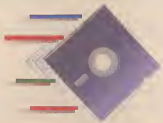

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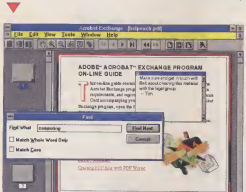
New!

Adobe's Amazing Acrobat: The Rosetta Stone for PC Documents

LIKE ANY BOOK . . . Acrobat adheres to literary as well as computing conventions. You can create text "bookmarks" with Acrobat to mark sections of text (see Guided Tour, page 48). The bookmarks provide a customized outline of a document that can be displayed alongside the open page. You can click on the bookmarks to move to a specific page.

Want to search out a word or phrase, as seen above? Acrobat uses a search engine instead of an index. Acrobat Exchange lets you make your own margin notes. You can even cross-reference other parts of a PDF document by creating hotlinks. This last feature makes for a good way to navigate training and technical documents via hypertext links.



YOU'VE NEVER SEEN anything like Adobe Acrobat before. We guarantee it. Acrobat's revolutionary document formatting and viewing technology enables you to share your documents electronically in all their colorful glory—regardless of the hardware platform, operating system, or even application software and fonts that are resident on the receiving end. If this sounds like a cross-platform Rosetta stone, then you're beginning to understand the potential of Acrobat's technology.

The key to Acrobat is Adobe's Portable Document Format (PDF), a file format that describes all the key elements of a document: graphics, color, text, fonts, format, and images. Built into the software are two multiple master fonts (a serif and a sans-serif) that can simulate any original fonts not on the computer that's viewing the document.

The Acrobat family has several members. The $195 Acrobat Exchange, the core product, enables you to create, annotate, view, and print PDF documents. Because more people read than write documents, there's a less-expensive Acrobat Reader solely for viewing and printing PDF documents. This lists for $50, but the price shrinks to $40 each for more than 100 copies. The high-end Acrobat Distiller ($695) converts existing PostScript files into PDF files; it's available in a network server version. These products currently support both Windows and Mac environments.

Although Acrobat is clearly a sophisticated technology, we found creating and working with Acrobat documents straightforward. Installing Acrobat Exchange also automatically installs the Acrobat PDF Writer, a special printer driver that allows any application with a Print command to create a PDF file. For example, let's say you have a 40-page PageMaker document with 24-bit-color images, loads of fonts, spot color, and so on. To turn it into an Acrobat document, you would choose the PDF driver from PageMaker's Print menu and print to a PDF file. The PDF file can be transferred electronically or on disk, and any system with either Acrobat Exchange or Acrobat Reader can open the document and see it much as it was in its original form.

Navigate Your Documents

Acrobat includes a host of navigational tools for moving through the PDF document, along with the abilities to pan, scroll, and zoom in on specific areas. You can also leaf through an Acrobat document page by page or jump to a specific page. To view large documents more easily, display thumbnail representations of each page in the margin of the open document. You can then scroll through the thumbnails and jump to a specific page in the main window by double-clicking on that thumbnail.

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As with Adobe's most renowned technology, PostScript, Acrobat creates documents that are independent of device and resolution—in other words, you can see or print information at the highest quality that the viewing system supports. This is a big advantage when sharing documents among different systems. And Acrobat not only saves paper, it saves disk space, too: PDF files are compressed upon creation. We compressed a large file by several orders of magnitude by "printing" to PDF format.

The potential applications for Acrobat documents are unlimited. You can circulate a formatted color proposal within a work group for annotation (regardless of the hardware being used), send an electronic catalog to a customer, or transmit impressive presentations.

Of course, Acrobat still has room for maturing. Most basic font substitutions work fine, but occasionally Acrobat produces text that doesn't do justice to the original—especially with decorative fonts and symbols. Still, these criticisms are akin to saying the *Venus de Milo* would be a better statue if it had arms. It's a masterpiece the way it is.

Adobe Acrobat isn't quite ready for that level of praise, but it's the best way we've seen to make great-looking documents that can literally go anywhere. **JON PEPPER**

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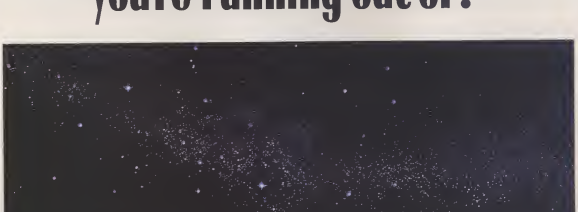

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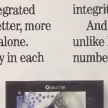

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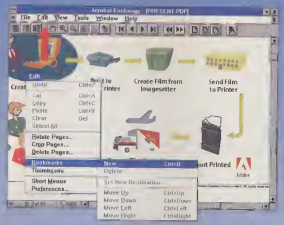
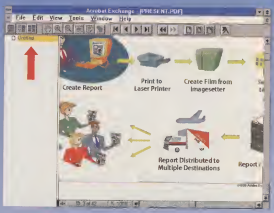
New!

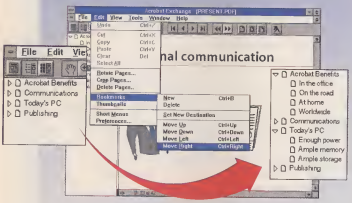
If You've Ever Used a Bookmark, You Know How to Use Acrobat



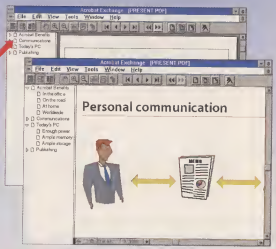
1. It's almost as easy to put bookmarks in an Acrobat Exchange document as in a regular book. Find the right page in page view, and either press Ctrl-B or select Edit, Bookmarks, New from the menu bar.



2. A bookmark icon appears in the margin to the left of the document with *Untitled* next to it—simply type in a title. You can also adjust the page view (with the hand icon) to tie the bookmark to a different part of the page.



3. You can create subordinate bookmarks—which are like subsections on an outline—by indenting existing ones: Either select Move, Right or press Ctrl–right arrow. Click on the wedge next to the bookmark icon to reveal subordinate bookmarks.



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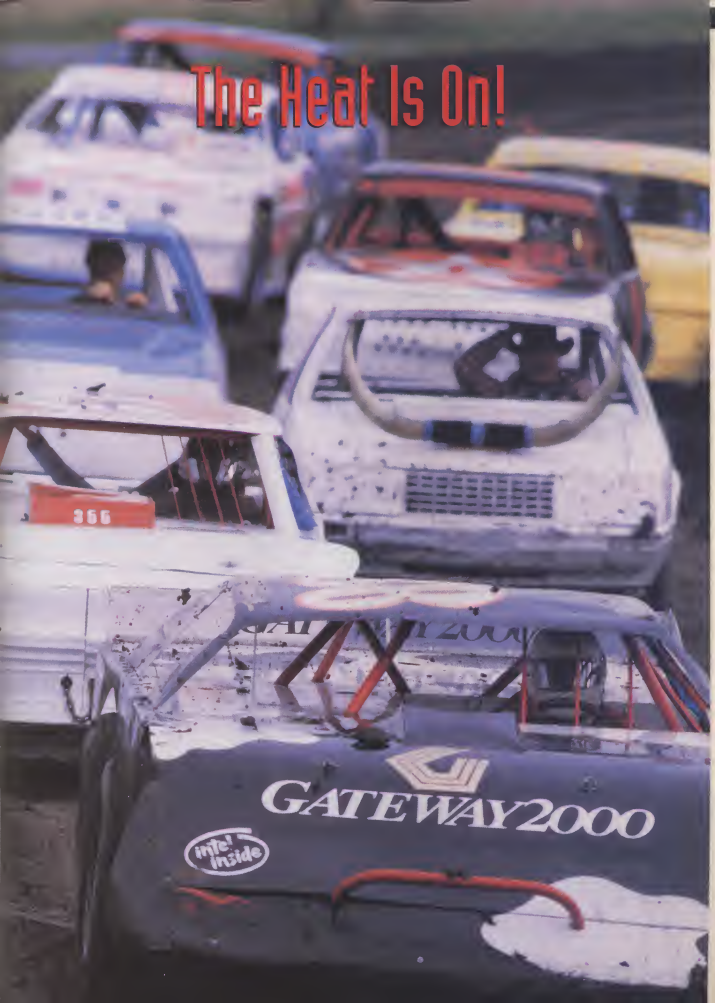
The Heat Is On!
GATEWAY2000
intel inside

They're In Hot Pursuit Of The Value Leader...

But Gateway Outmaneuvers The Competition — And You Win!

In the fast-moving, hard-driving PC industry, the race for leadership is more competitive than a heat at your local stock car speedway. All classes of PC manufacturers are on the direct market track together, trading paint and slamming each other into the wall at every turn. Competitors big and small are being black-flagged and sent to the pits in record numbers this year.

All the while, season after season, the unassuming cow-spotted Gateway car consistently outmaneuvers and overpowers the competition. Repeatedly, Gateway 2000™ leads the field by providing you with the best value in the PC industry. When Gateway takes the checkered flag in this race, you're the winner!

weight get out of control (unlike some competitors). We've carefully maintained our unique, low-overhead business model with no extra parts to slow us down. The Gateway machine handles extremely well, too. We can move faster through the marketing corners without getting out of control, all of which saves you money when you buy from Gateway.

Our competitors would like to have you think they're now offering a value that meets or beats Gateway. But apples to apples, they're still hundreds, sometimes thousands of dollars more, while our systems consistently outperform theirs.

You're a smart shopper. Do the comparisons yourself and you'll confirm what Dataquest™ found in a 1993 customer satisfaction survey: Gateway ranked number one for best pricing. When you add the other buying criteria that's important to you, Gateway offers an unbeatable value

What's The Winning Formula?

The driving strategy behind Gateway's success is simple: *understand what customers want and give it to them!*

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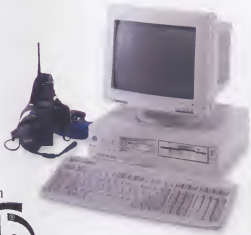
We understand you want the best possible price — and that's easy for Gateway. Like a winning stock car, we have the right combination of power, weight and handling to lead the price field.

We have the power to buy the highest quality components in huge volume at considerable savings, which we always pass on to you. Even though we're now one of the largest PC makers in the U.S. and a Fortune 500 company, we haven't let our



intel inside

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Gateway 2000's summer fun ad was inspired by our stock car racing team. As you might guess, we don't spend millions on an Indy car. Ours is an all-employee team that runs on local dirt tracks. The team races pretty much the same way Gateway operates: they're competitive and successful, but they always have fun!

38
GATEWAY 2000

Gateway Gives You More Horsepower.

Performance

We understand you want the best computer performance your money can buy. That's what you get with Gateway. We hold the track record in the biggest bang-for-the-buck division.

Take our 4DX2-66V system, affectionately known as the Big Kahuna, for example. In automotive terms, this system is a top fuel dragster. It has won 11 major industry awards, and they just keep coming because the 4DX2-66V includes the best of everything at a terrific price. Another example is our Nomad 450DXL. This portable is in the off-the-road vehicle category, but its 50MHz 486 DX2 processor makes its engine that of an open-wheel racer. We'll have colorful, new sprint cars ready to enter in the upcoming notebook and HandBook® races. Watch for them!

That's the Gateway price-performance ratio, and it's equally good across our entire product line.

Latest-Generation Graphics

Our price-performance ratio is even better this month thanks to improved graphics on our highest performance systems. We replaced ATI's Graphics Ultra Pro, the industry's leading graphics card, with ATI's latest-generation Graphics Ultra XLR. The new XLR is up to twice as fast as the Ultra Pro, and it's the best all-around DOS and Windows™ video performer in the industry.

The ATI™ Graphics Ultra XLR is also multimedia ready, enhancing and accelerating video for Windows through hardware. When viewing motion video, you can enlarge your window size to full screen without decreasing your frame rate, getting jaggy edges, color distortion or losing audio sync.

Compatibility & Upgradeability

We understand compatibility and upgradeability are important to you. You can relax with Gateway. When Datapquest asked 833 PC users in Fortune 500 companies to rate personal computer companies, they ranked Gateway number one in the areas of compatibility, upgrade potential and price. All Gateway systems go through extensive compatibility testing to ensure flawless performance with all products from major software developers and peripherals manufacturers. And we give you a *written guarantee* that our 486 systems are upgradeable to Pentium technology. Ask us about it.

intel inside

GATEWAY2000

"You've got a friend in the business."®

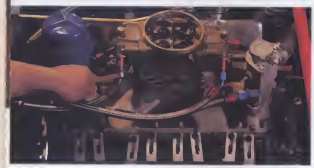
800-846-2062

Mike Schmith, Gateway 2000 Marketing Manager, drives the Gateway race car. "Schmitty" says the race to market with the very best products for Gateway is even more intense than his weekends behind the wheel.

Gateway's Award-Winning Team Is Behind You All The Way.

Reliability & Quality

We understand you want reliability and quality, in both the products you buy and the company you buy them from. That's what you get with Gateway. In the two most recent reader surveys conducted by *PC Magazine*, Gateway systems received the highest ratings for reliability. We earn these awards because we use only the best quality



components in our computers, and they're manufactured with Midwest pride and painstaking quality-control procedures. Gateway 2000 is also one of the most financially stable companies in the industry, assuring you that you're buying from a reliable manufacturer that can withstand the rigors of the PC Racing Series.

Service

We understand you want the best in service, from your first phone call through the years you own your computer. You can count on Gateway to live up to your expectations. Our representatives are mostly Midwest born and raised, and it shows in the friendly, caring way we work with customers.

Every Gateway 2000 system comes with excellent after-the-sale support. You get a 30-day money-back guarantee. If you don't like your system, send it back within 30 days for a refund.

All systems come with a one-year limited warranty and telephone technical support for the life of the system. When you need help with your PC, whether it's not working or you just have a question, you want a fast, skilled crew waiting for you in the pits. That's what you get with Gateway's award-winning technical department. We received *PC World's* World Class Award in 1992 for best service and support in the hardware category. In a February 1993 survey, *PC Magazine* readers once again gave Gateway an excellent rating for service and reliability. And in June, *BYTE* readers echoed the other awards, choosing Gateway 2000 as the company that provides the best service in the industry.

intel inside

SERVICE & RELIABILITY CHOICE PC MAGAZINE

PC WORLD WORLD CLASS AWARD 1992

1993 BYTE READERS' CHOICE AWARD

GATEWAY 2000

"You've got a friend in the business."®

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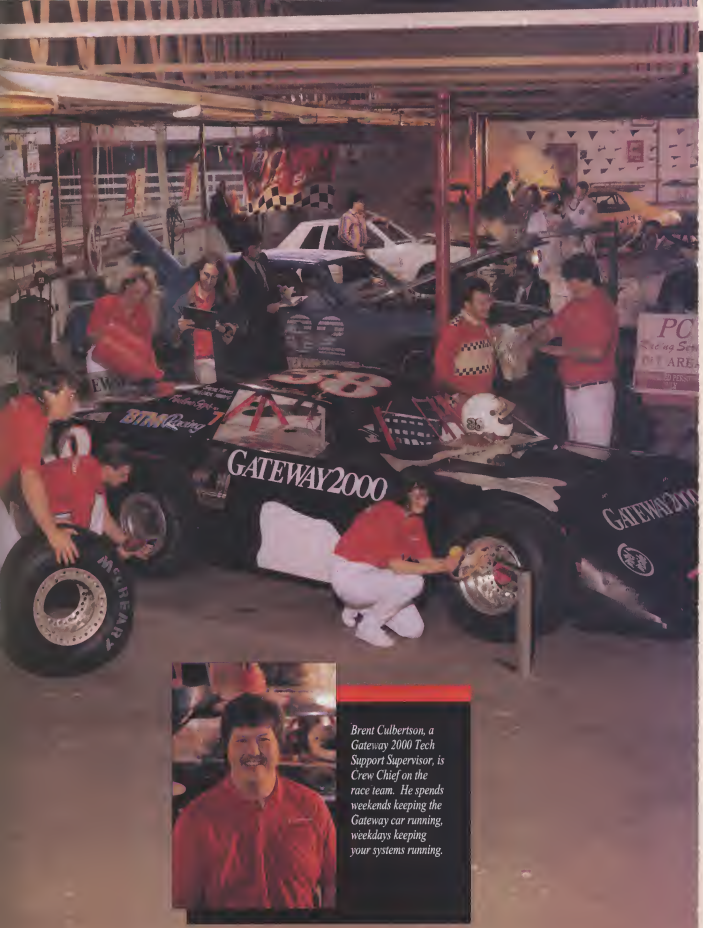

Brent Culbertson, a Gateway 2000 Tech Support Supervisor, is Crew Chief on the race team. He spends weekends keeping the Gateway car running, weekdays keeping your systems running.

Gateway 2000's Fast PCs

4SX-25

- 25MHz 486SX Intel® Processor
- 4MB RAM
- 3.5" Diskette Drive
- 170MB 13ms IDE Hard Drive
- Intel Pentium™ Technology Ready
- Windows Accelerated Video w/512K DRAM
- 14" Color CrystalScan® 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey® Keyboard & MS Mouse
- MS-DOS® 6, Diagnostics & Windows™
- MS Works for Windows™ 2.0

$1295

4SX-33

- 33MHz 486SX Intel Processor
- 4MB RAM
- 5.25" & 3.5" Diskette Drives
- 212MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Windows Accelerated Video w/ 512K DRAM
- 14" Color CrystalScan 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- MS Works for Windows 2.0

$1495

4DX-33

- 33MHz 486DX Intel Processor
- 8MB RAM, 64K Cache
- 5.25" & 3.5" Diskette Drives
- 212MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Windows Accelerated Video w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- MS Works for Windows 2.0

$1795

4DX-33V

- 33MHz 486DX Intel Processor
- 8MB RAM, 128K Cache
- 5.25" & 3.5" Diskette Drives
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- Windows Accelerator w/ 1MB DRAM on VL-Bus™
- 14" Color CrystalScan 1024NI
- Desktop Case (Tower Upgrade)
- 7 16-Bit ISA Slots, 2 on VL-Bus
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- MS Works for Windows 2.0

$1995

4DX2-50V

- 50MHz 486DX2 Intel Processor
- 8MB RAM, 128K Cache
- 5.25" & 3.5" Diskette Drives
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- ATI™ Ultra XLR Video w/1MB VRAM on VL-Bus
- 15" Color CrystalScan 1572FS
- Desktop Case (Tower Upgrade)
- 7 16-Bit ISA Slots, 2 on VL-Bus
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- Choice of Application Software

$2295

4DX2-66V

- 66MHz 486DX2 Intel Processor
- 16MB RAM, 256K Cache
- 3.5" Diskette Drive
- CD-ROM Drive
- 424MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- ATI Ultra XLR Video w/1MB VRAM on VL-Bus
- 15" Color CrystalScan 1572FS
- Desktop Case (Tower Upgrade)
- 7 16-Bit ISA Slots, 2 on VL-Bus
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows on CD
- Choice of Application Software

$2995

4DX2-66E

- 66MHz 486DX2 Intel Processor
- 16MB RAM, 256K Cache
- 5.25" & 3.5" Diskette Drives
- 500MB 11ms SCSI Hard Drive
- 32-Bit EISA SCSI Controller
- Windows Accelerated Video w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- Tower Case
- 8 32-Bit EISA Slots
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- Choice of Application Software

$3495

NOMAD 450DXL

- 50MHz 486DX2 Intel Processor
- 3.5" Diskette Drive
- Backlit 10" VGA Screen, 64 Gray Scale
- Simultaneous Video with 1MB
- Size 8.5" x 11" x 1.8," 5.6 Lbs.
- 6-Hr. NiCad Battery & AC Pack
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(With 8MB RAM and 200MB Hard Drive)

4DX2-66 BEST BUY

- 66MHz 486DX2 Intel Processor
- 8MB RAM, 128K Cache
- 3.5" Diskette Drive
- CD-ROM Drive
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- Windows Accelerator w/1MB DRAM on VL-Bus
- 15" Color CrystalScan 1572FS
- Desktop Case (Tower Upgrade)
- 7 16-Bit ISA Slots, 2 on VL-Bus
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows on CD
- MS Multimedia Works, CD-ROM Edition

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intel inside

Caviar

Printed on recycled paper with soy inks.

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All hard drive sizes are manufacturer's specified capacities. Microsoft MS-DOS 6 can increase hard drive capacity through software compression.

This year's summer fun ad was photographed at Park Jefferson International Speedway, a NASCAR-sanctioned track just a few miles from the Gateway 2000 plant. Our thanks to Park Jefferson people and local stock car drivers for their participation.

And PC Racing Accessories

SOFTWARE

Microsoft Works for Windows™
Many of our systems come with Works, the single program that combines all the tools you need to run a business: word processor, spreadsheet, database and electronic communications. It's simple to use yet provides power and functionality.

With systems that include "choice of application software," select one of the following software packages. All applications are latest versions.

Microsoft Excel for Windows™

Microsoft Word for Windows™

Microsoft Word and Bookshelf '92,® CD-ROM Edition
The most popular word processor for Windows now becomes the ultimate writing tool with an entire multimedia reference library including dictionary, encyclopedia, thesaurus, atlas, quotations, and more.

Microsoft PowerPoint for Windows™

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The MS Entrepreneur Pack
Microsoft Works,™ Publisher,™ Money™ and an Entertainment Pack.

Borland Paradox® and Quattro Pro® for Windows

The Windows Programmer Pack
Microsoft QuickC for Windows,™ Visual Basic for Windows,™ Windows Control Development Kit,™ Windows Help Compiler™ and Windows Programmer's On-Line Reference.™

Software Upgrades

Microsoft Office™ — You can upgrade from a choice of application software to Microsoft Office, CD-ROM version, for only **$99**! This single package has all the leading Windows applications: Word, Excel and PowerPoint. The standard edition of MS Office is also available as an upgrade from a choice of application software for **$175**, or **$499** as a second application.

Choice of Application — If the system you want comes with MS Works for Windows, you can upgrade to a choice of application software for only **$100**.

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All software is pre-installed and ready to run when your system arrives!

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Internal fax/modem, 14,400bps modem, V.32bis, with 9,600bps fax capability. Package includes software — WinFax Pro,® Crosstalk™ for Windows and Qmodem — plus a free CompuServe® trial membership. **$195**

Network Cards
Call for a selection of Ethernet cards and Token Ring adapters, installed and configured.

Microsoft Windows™ for Workgroups
Networking made easy! Share files and printers, send electronic mail, schedule group meetings with the click of your mouse — and get everything you need in one inexpensive package. Price includes an Ethernet adapter and software. Hardware and software are factory-installed. **$159**

Upgrade to CD-ROM
Get a CD-ROM drive instead of a 5.25-inch floppy for only **$175**! With this special upgrade offer, you get a CD-ROM, interface card, a free system CD with Microsoft Multimedia Pack™ and more — everything you need to add MPC-compliant CD-ROM to your PC. (Price good only for upgrades at the time of system purchase.)

Microsoft Windows Sound System™
Here's the sound system designed for business, complete with a headset for private office use. With it you can "speak" commands to your PC for hands-free operation. Embed audio messages in Windows OLE applications. Play your Ad Lib® and Sound Blaster™ games — and more! Our special Gateway price includes soundboard, microphone, headset and software. **$149**

Colorado Memory Systems™ TBU
250MB internal automatic tape backup unit copies up to 9.5MB per minute with high-speed data compression. Comes with easy-to-use DOS software, one tape and cable. **$195**

CrystalScan® 15-Inch & 17-Inch Monitors
Non-interlaced color monitor with flat, square screen, .28mm dot pitch. If your system comes with a 14-inch monitor, you can upgrade to the 15-inch model for **$100**, or the 17-inch for **$600**. If your system comes with a 15-inch monitor, you can upgrade to the 17-inch monitor for **$520**. (Prices good only for upgrades at the time of system purchase.)

Panasonic® KX-P2123 Color-Capable Printer
Add color to your documents with this 24-pin dot matrix printer. Includes Adobe Type Manager.® Call for price!

Texas Instruments® MicroLaser™ Plus Laser Printer
Never before has such a small, Postscript® laser printer offered so much speed and economy. The MicroLaser Plus is only 13.4" x 14.2", yet it prints 9 pages per minute at 300dpi. Call for price!

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The software and peripherals listed here are sold only with the purchase of a system. For details on our complete line of extras for Gateway customers, ask for our special add-on components division when you call.

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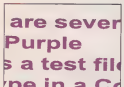
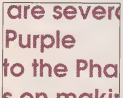
Is That Really Printer Output? Kodak's ColorEase Can Fool You

GORGEOUS COLOR
It's cheap and it's here. Dye sublimation (top) produces the best-looking color output you can find for less than $10,000. Thermal wax transfer and color ink jet printers



KODAK DYE SUB



THERMAL WAX

approximate colors by *dithering*—that is, printing fine dots of color next to each other, cyan and magenta for example, so that from a distance the character or image looks purple (bottom).

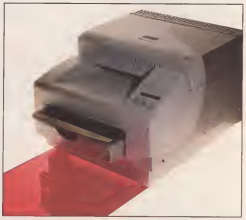
Dye sublimation, on the other hand, changes the wax into gas and applies the different colored gases at different levels to the paper. So what appears to be a purple dot is a cyan dot overlapping a magenta one.

COLOR PRINTER PRICES are dropping as fast as Bill Clinton's approval ratings. Kodak is leading the descent with its aggressively priced new ColorEase PS Printer. The new color dye-sublimation printer is priced at $7,999—$2,000 less than the market leader, Tektronix's Phaser IISDX. And with an expected street price of less than $7,000, it will make eye-popping color presentations affordable.

Dye-sub output is gorgeous, but the technology has a limitation: It's slow. The ColorEase's print engine is rated at a sluggishs 3.5 minutes per page, even though it uses a speedy RISC-based 40MHz SPARC processor and built-in Adobe PostScript Level 2 to quickly process large color files. It took nearly 12 minutes to print a 3-page PowerPoint presentation. Tektronix's dye-sublimation printer, the Phaser IISDX, is slightly faster, taking just under 11 minutes to print the same file. These slow print times are typical of dye-sub printers. Thermal wax transfer is much faster—the Tektronix Phaser 200e printed our PowerPoint presentation in under 2.5 minutes. Dye sublimation also exacts a high cost per page. The required paper is more expensive than the clay-coated paper that thermal wax printers use. Still, the Kodak ColorEase has a lower cost per page than the Phaser IISDX.

The ColorEase includes a generous 16MB of RAM and an internal 120MB hard disk. You can't add memory, but you won't need to since this printer uses the hard drive as virtual memory to buffer incoming print jobs. The printer's external SCSI port allows you to attach a hard disk for additional font storage.

The ColorEase also includes serial, parallel, and AppleTalk interfaces. An EtherTalk interface is available for $495, and Kodak expects ethernet and token-ring cards for NetWare to be available from third-party suppliers.



Kodak's ColorEase PS Printer makes color dye-sub printing affordable. The $7,999 price includes 16MB of RAM and an internal 120MB hard drive.

Tektronix's Phaser IISDX includes a rendering algorithm that helps it print fine lines and text better. In our print samples, the Phaser IISDX's text was crisper than the ColorEase's text, which was somewhat blurred at the edges. However, your clients will be too busy admiring the ColorEase's fantastic color print quality to notice some fuzzy text edges.

Near-photographic print quality, speedier transparency printing, and a $2,000 price break make the Kodak ColorEase a better choice than the Phaser IISDX for printing color presentations. **CYNDY BATES**

KODAK COLOREASE PS PRINTER, $7,999 • EASTMAN KODAK DESKTOP IMAGING DIVISION • (800) 344-0006

PC/COMPUTING LAB REPORT:

YOU WANT FAST? THERMAL WAX IS STILL THE WAY TO GO

Longer bars represent better performance relative to the Tektronix Phaser IISDX.

Product	PowerPoint Presentation (paper)	PowerPoint Presentation (transparency)
Kodak ColorEase PS Printer (dye sublimation)	10% Slower	91% Faster
Tektronix Phaser 200e (thermal wax transfer)	346% Faster	Test not run
Tektronix Phaser IISDX (dye sublimation)	Baseline	Baseline

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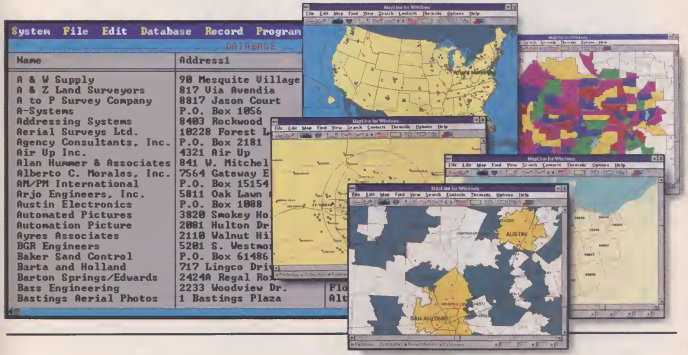
THIS IS YOUR DATABASE ON MAPLINX.



MapLinx plots your data on detailed U.S. maps – giving you incredible planning, analysis and decision-making power!

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You will, with MapLinx for Windows. MapLinx automatically plots your data on U.S. maps accurate all the way down to individual zip codes and highways. For the first time, you'll be able to *see* your data – for incredible planning, analysis and decision-making power!

Put your business on the map.

Across America, business professionals are using MapLinx to geographically analyze sales, service and competitive activity. To distribute leads, create balanced territories, and plan mailings and advertising with rifle-shot accuracy.

MapLinx is a *must* for planning local or out-of-state travel. It highlights prospects and customers within a given distance of a point, so you can efficiently "group" your appointments. You can even print hardcopies and plan your trips right on the map!

MapLinx is also a great tool for referring callers to their nearest dealer, service center, doctor or agent – depending on your business. It's perfect for planning service routes, analyzing store locations and much, much more. If you have a database, you *need* MapLinx!

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- Access, Approach, Paradox and other Windows databases.
- ACT!, PackRat and other Windows contact managers/PIMs.
- Excel, Quattro Pro and Lotus 1-2-3 for Windows.

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InfoWorld, 3/15/93

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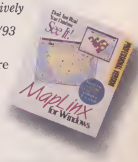
As part of a limited promotion, we're offering MapLinx for Windows at the remarkable price of only $299.95 (reg. $399.95). Available through Egghead and other software stores. *Call to order or for more information!*



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System Requirements: IBM AT, PS/2 or 100% compatible; Microsoft Windows' 3.0 or higher; DOS 3.3 or higher; 2 Mb RAM, EGA, VGA, XGA or SVGA video card; Microsoft® or compatible mouse

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Circle 181 on reader service card.

A Tale of Two Notebooks: TI Gets the Details Right

MHz Isn't All

When is a 486DX2/50 faster than a 486DX2/66? We found it's when the 486DX2/50 is couched in a super-tuned notebook from a name manufacturer. In our comparison between the Texas Instruments TravelMate 4000E and Altura ALT66C notebooks, TI's design more than compensated for the off-the-shelf clone's faster engine. The TI is proof of today's maxim: Forget about MHz and other mundane measurements—total system performance is what counts.

The TravelMate ran our WinWord and Excel test suites in a blistering 4 minutes and 15 seconds, and 4 minutes and 21 seconds, respectively. The ALT66C was certainly no piker, but it lagged behind the TravelMate, taking 5 minutes and 52 seconds on our Word tests and 7 minutes and 3 seconds on the Excel tests.

The TI clearly wins the speed prize, but you won't be watching the Windows hourglass with the ALT66C either. It's faster than most notebooks out there.

What's in a name? Speed, battery life, a little fit and finish, a little free software, and the instant computing gratification of a completely preconfigured portable—those are the advantages that Texas Instruments' TravelMate 4000E WinDX2/50 offers over the similar ALT66C from Altura Computer Systems. Both of these active-matrix color notebooks happened to land in our office at the same time.

TI TravelMate 4000E

Texas Instruments has been making notebooks for a long time. In fact, the company was there when the category was invented. It's big. It has a lot of money, a lot of homegrown technology, a lot of highly skilled engineers, a lot of marketing resources, and enough volume to be price competitive with anyone. Altura, on the other hand, is a small company from Manitou Springs, Colorado, which hopes to ship somewhere in the neighborhood of 2,000 notebooks this year.

If this story were a made-for-TV movie, the ALT66C would beat the hell out of the TravelMate, cash in on the American Dream, and get the girl. Alas, sometimes there's just no substitute for size and experience.

The Face-Off

The TravelMate 4000E is powered by Intel's 486DX2/50 processor and comes standard with 4MB of memory (expandable to 20MB), a 1.44MB floppy, and a 200MB hard drive. The Taiwan-built ALT66C has the same floppy and 4MB of memory, but a slightly larger 240MB hard drive. It also has much more raw CPU speed thanks to its Intel 486DX2/66 processor. But an application's performance isn't a function of processor power alone, and as our Windows application tests clearly show, TI's overall design more than compensates for the Altura's faster engine (see left).

Both machines offer the crispest, most readable color screen available today from the leading name in that game: Both are equipped with Sharp's high-quality 8.4-inch active-matrix color display and can simultaneously drive an external VGA color monitor. Each is capable of displaying 256 colors at 640-by-480-pixel resolution on its LCD and 16 colors at 1,024 by 768 on an external monitor. But the TravelMate's video subsystem talks to the CPU along a 32-bit local bus and is bolstered by a full megabyte of 60-nanosecond virtual RAM for faster screen updates than are possible on the ALT66C, which uses an 8-bit AT I/O bus and slower, less expensive dynamic RAM. In fact, this second-generation TI subsystem is 40 percent faster than those in previous TravelMates.

In addition, TI engineers have optimized performance in every aspect of the system, from the fast 60ns main memory to the use of burst mode on the 486DX2/50 chip.

It's About Size

These notebooks don't look much different on paper, but they do on your lap. At 11 by 8½ by a tad over 2 inches, the TravelMate is the smaller, sleeker, more stylish of the two. It weighs only (*continued on page 66*)

PC/COMPUTING LAB REPORT:

TI'S TRAVELMATE: SUPER-TUNED DESIGN HELPED IT WIN

Tests consist of a series of common business operations in Excel and Word for Windows. Longer bars represent better performance relative to Compaq's Contura 486 color notebook.

Product	Word for Windows (mixed tasks)	Excel (graphics-intensive test)
Texas Instruments TravelMate 4000E	99% Faster	88% Faster
Altura ALT66C	23% Faster	36% Faster
Compaq Contura	Baseline	Baseline

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Circle 147 on reader service card.

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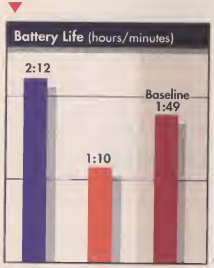
TI KEEPS CHUGGING

Experience poys. TI hos long been developing a proprietary power-monogement design. Suffice it to say TI has added power-conservation features to every subsystem, right down to the ability to turn off the CPU between keystrokes. The Altura ALT66C's power-management capabilities, on the other hand, are restricted to holving the speed of the processor ond offering user-definable time-outs for the LCD and hord drive. For testing, we ron both machines flot out—with continuous typing, LCD on constontly, ond frequent hard drive occess. Here, too, the TI stood out.



NOTEBOOKS, *from page 62*

6.2 pounds, and its diminutive AC adapter and cabling bring its traveling weight up to a fraction more than 7 pounds.

The ALT66C is a half-inch taller, and because it has an external, screw-in battery pack, it's also a couple of inches deeper. That design adds a noticeable 2 pounds to its normal 6-pound weight and makes the ALT66C a chubby notebook. Toss the large AC adapter, cabling, and external keypad into its carrying case, and you'll be toting almost 10 pounds through airports—more than enough ballast to keep your garment bag from pulling you over onto your side. It's a heavyweight compared to the TravelMate.

Still, you would expect to gain a little extra battery life in exchange for the extra weight. Both companies claim 2 or more hours of continuous operation per battery charge for their nickel-cadmium batteries, but in our battery-life tests the Altura's lasted about 1 hour and 10 minutes. But the TravelMate ran 2 hours and 12 minutes (see below).

It's Also About Look and Feel

The TravelMate keyboard incorporates a completely new design. Its full-size keys travel 4 millimeters and land so softly and squarely that you can barely hear them—ideal for unobtrusive typing on an airplane. You also get 12 separate function keys and dedicated cursor and paging keys. The ALT66C keys travel an acceptable 3mm but are small and clacky. We prefer the Altura's handy embedded trackball to the flying trapeze of the TravelMate's Microsoft Quickport Ballpoint.

The TravelMate—with a street price of about $4,400 for a system with 4MB of RAM and a 200MB hard drive—comes with DOS 6.0 and Windows 3.1 loaded, as well as some useful utilities. Turn it on and you'll find yourself in Program Manager.

On your desktop will be a series of TI-written utilities to help you navigate Windows more quickly. You'll find a notepad and a quick-delete icon onto which you simply drag and drop files. The Shut-down icon closes currently saved applications and takes you into DOS without the usual redundant Windows prompts to answer. Wsetup, under the Windows Control Panel, is a handy utility that enables you to change all of your hardware and software settings without resorting to DOS. Advanced BatteryPro software gives you a gauge for monitoring the battery, and you also get the traditional TI DOS file manager as well as menu utilities for shelling out to DOS quickly.

Altura ALT66C

Altura's system arrived with nothing more than COMMAND.COM for DOS 5.0 loaded in a root directory and a disk full of video drivers. It didn't even include DOS utilities, which slowed our testing considerably (the first system we received had a hardware or BIOS problem that prevented us from loading Windows 3.1 and our test suite).

One extra you do get with the ALT66C is a second serial port so that you can hook up, say, Traveling Software's Laplink cable without having to unhook other serial devices. You also have the option of adding a 540MB hard drive to the Altura. Aside from these extras, both machines have the usual complement of serial, parallel, and mouse ports and expansion buses for docking stations.

So you're probably guessing that the ALT66C costs thousands less than the TravelMate, right? Sorry, no—just hundreds. The list price of the ALT66C with 4MB of memory and a 240MB hard drive is $4,295; with 16MB of memory and a 540MB hard drive, the price is $5,890. (Of course, the street prices will be lower than that.) Given that, TI clearly wins this face-off. But then it ought to, considering the years of experience the company has behind it. Altura is a new company and an early entrant into the high-end notebook market. The company may get it right next time.

MIKE HOGAN

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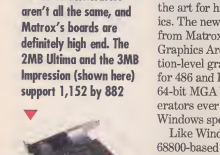
Matrox's Latest Accelerators Are Easily the Fastest We've Seen

DIFFERENT FLAVORS Windows accelerators aren't all the same, and Matrox's boards are definitely high end. The 2MB Ultima and the 3MB Impression (shown here) support 1,152 by 882 pixels (the two-page resolution preferred for page layout) at 74Hz refresh rates and even the ultrahigh 1,600-by-1,200 resolution used for document imaging (though only at a 60Hz refresh rate, which makes for flicker). The Impression includes the option to add 2MB of dynamic RAM to speed up CAD-like functions such as 3-D polygon rotation and manipulation. Matrox makes Micro Channel and VESA local-bus versions of the 2MB and 3MB versions; PCI and EISA boards are in the works.



WANT ULTIMATE PC graphics speed? Workstations—not PCs—still represent the state of the art for high-speed, high-resolution graphics. The newest generation of graphics cards from Matrox, called the MGA (Multimedia Graphics Architecture) Series, brings workstation-level graphics to desktop PCs. Optimized for 486 and Pentium-based systems, Matrox's 64-bit MGA boards are the fastest video accelerators ever to come through our labs. They're Windows speed demons.

Like Windows accelerators such as the 68800-based ATI Graphics Ultra Pro and the S3 928-based #9GXE from Number Nine, Matrox's MGA boards speed up common graphics functions under Windows. But Matrox's MGA chip has another trick for spurring performance: By using a 64-bit-wide data path to the frame buffer (versus the 32-bit path of the ATI and S3 chips), it's able to send and receive twice the data to and from video memory in the same amount of time.

When it comes to performance, the MGA chip lives up to its promise. Tested on a 50MHz 486DX2, the 3MB ISA-based Impression beat out both the ATI Graphics Ultra Pro and Number Nine's #9GXE (which until now was the fastest accelerator we'd tested).

Performance has its price, of course, and Matrox's MGA boards range from $599 to $1,499 depending on the colors and resolutions you need. The $599 1MB MGA Ultima handles resolutions up to 1,024 by 768 pixels with 256 colors and flicker-free refresh rates of 76Hz. It also supports up to 32,768 colors at lower resolutions. The $849 2MB Ultima supports 256 colors at 1,280-by-1,024 resolution and 32,768 colors at 1,024-by-768 resolution. A $1,299 3MB version of the board, the MGA Impression, supports 24-bit color (16.7 million colors) at 1,024-by-768 resolution.

To take advantage of the boards' features, Matrox includes a series of software utilities with each. The ModeSwitch utility switches Windows resolutions using a simple keystroke combination (without restarting Windows), while the PixelTouch utility activates the boards' built-in hardware pan and zoom.

Other innovations to the MGA boards include an optional add-on video-capture board and a connector for Matrox's forthcoming LaserPro acceleration kit. Due out in September, the $299 LaserPro accelerator is intended to speed graphics printing on Hewlett-Packard LaserJet printers by having the PC's CPU rasterize the image instead of waiting for the printer's slower PCL translator.

Matrox's MGA boards are overkill for anyone merely looking for a performance boost under Windows. More modest graphics accelerator cards, such as those built on the S3 801 chip, cost less than $300 and offer more bang for the buck. If performance is paramount, however, the $599 to $849 MGA Ultima models compete with the likes of ATI's $799 Graphics Ultra Pro and the $695 #9GXE (which was reviewed in May New!, page 60), offering more resolutions and color options, in addition to faster performance.

WENDY TAYLOR

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PC/COMPUTING LAB REPORT:

MATROX'S ACCELERATOR WHIPS BY TWO OTHER LEADING BOARDS

Tests consist of a series of common business tasks in several Windows applications. Longer bars represent better performance relative to ATI's Graphics Ultra Pro.

Product	Word for Windows	Excel (graphics)	CorelDraw (graphics)
Matrox MGA Impression (3MB)	148% Faster	169% Faster	104% Faster
Number Nine #9GXE (2MB)	102% Faster	97% Faster	75% Faster
ATI Graphics Ultra Pro (2MB)	Baseline	Baseline	Baseline

ALL BOARDS ARE ISA-BASED AND WERE TESTED ON A 486DX2/50 WITH 8MB OF RAM. ALL TESTS WERE RUN AT 1,024BY-768 RESOLUTION, WITH 256 COLORS.

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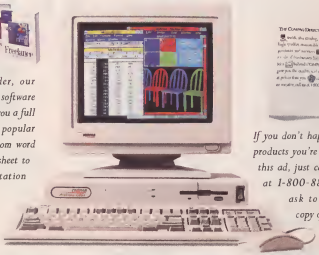

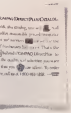

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DESKPRO/i Features

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New Umax Scanners: More Color, More Resolution, More Bucks

FOR SERIOUS SCANNING, 600 dots per inch doesn't cut it. Fine line art or transparencies demand higher resolution, better optics, and the ability to interpolate to even higher resolutions than the scanner can read. General-purpose color scanners capture 24 bits of color information at resolutions of between 400 and 600 dpi. Two new scanners from Umax go several steps further—they interpolate 1,200-dpi scans right up to 2,400 dpi.

Umax's UC 1260 and UC 1200SE scan in sharp, faithful color. Both the highlights and the shadows in our test images survived the scanning process—a rare feat with flatbed scanners. In fact, the color reproduction of these two scanners is on a par with or better than the scanners featured in this year's *PC/Computing* Hardware Buyer's Superguide (June 1993, page 124).

Both of the scanners are driven by TWAIN-compliant scanning software and ship with the full version of the top-of-the-line image editor Adobe Photoshop. Photoshop's Acquire command brings up Umax's scanning software—a deceptively simple application that takes the guesswork out of cussed settings like brightness and contrast. Once you've previewed an image, you click on a single button to optimize those settings, then make the final scan.

The drawback? You pay for the quality you get. At $2,495, the UC 1260 is the more affordable scanner. For a 600-by-1,200-dpi flatbed scanner with an 8½-by-14-inch window, it's reasonably priced but still twice the median price of its 400- and 600-dpi cousins.

The UC 1260's three-pass color engine works at a fairly respectable clip, reading in about 16.7 kilobytes per second of 24-bit color information on our test system. While speed will vary from system to system, this scanner is faster than all but two of the scanners we reviewed in the June hardware roundup.

The $4,600 UC 1200SE is even faster by virtue of its 2MB input/output buffer and one-pass scanning engine. At 24.2 Kps, the speed increase isn't stellar, but that's because the scanner is processing 30 bits of color per pixel instead of the standard 24 (see left).

Despite their high test scores, both scanners leave room for improvement. Installation on networked or peripheral-laden PCs could be simplified—checking for free IRQs is left to guesswork. The scanners would benefit from a diagnostic utility that provides the best dip-switch settings, like the one provided with the Hewlett-Packard ScanJet series. And the Umax TWAIN source-scanning software stays put after each scan; you have to physically close the window to save or work with the image.

The upgrade options are well covered. Being TWAIN compliant, the scanners can run with most any image-editing software made since fall 1992. As soon as 32-bit color editing becomes common on the PC, Umax will have a simple erasable programmable read-only memory (EPROM) upgrade ready for the 30-bit 1200SE. And to take advantage of the high scanning resolutions, you can buy an $895 transparency-scanning unit for both scanners.

These scanners aren't for everybody. They aren't cheap, but for power scanning, either unit will serve you well. **MATTHEW LAKE**

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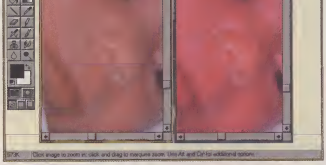
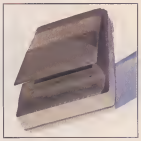


Thanks to its ability to capture 30-bit color, the UC 1200SE scanner renders even more realistic flesh tones (see image on left) than the 24-bit-color UC 1260 scanner does (right).

30-BIT COLOR

More is better. Umax's 1200SE reads in more color information than most flatbed scanners—30 bits of color, which is



several orders of magnitude more than 24-bit color. Since PC image-editing software can't currently manipulate a billion colors and display hardware can't show them, the 1200SE scanner's EPROM chip filters the optimum 24 bits of color data from the 30 bits it scans in and sends that to the PC.

The result? Great color from an optimized color palette. This was especially noticeable in our tests—photos of flesh tones (see sample at left). Scans from a 30-bit palette looked great, even on 24-bit equipment.

This 30-bit technology comes at a premium price ($4,600), but if you need the best color it's money well spent.

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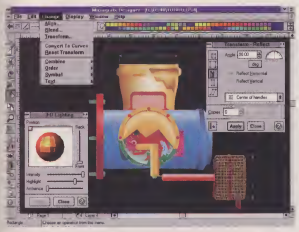

Designer 4.0's new intuitive interface is easy to learn and use with hint lines and context-sensitive help.

Designer 4.0 is just as powerful for graphics and design. Precise color creation starts with 4-color TRUMATCH® and PANTONE® color matching systems, continuing through to advanced color separation. Image group editing features include contrast, brightness, and color correction. Reshape objects quickly, even edit grouped objects without ungrouping. Text management is stress-free with 250 Type 1 and TrueType fonts, as well as single-step stretching, warping, and extrusion. Plus, linked text containers let your words of wisdom flow from one box to the next ever so smoothly.*

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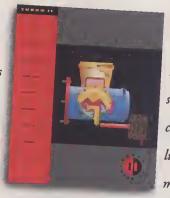

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Spotlight

Speech Recognition

The age of voice command for computers comes a giant step closer this month with the introduction of several speech-recognition software and hardware products.

PC sound-processing pioneer Creative Labs has updated its **Sound Blaster 16** add-in audio card with a speech-recognition capability called VoiceAssist that's based on Voice Processing Corporation's VProCommand engine. VoiceAssist can be quickly trained to recognize more than 1,000 voice commands for each of 30 Windows applications and is tuned to recognize the speech patterns of a person even if he or she has a cold. You issue commands through an included microphone, and the commands are output to either a PC speaker or higher-quality speakers. ($249; Creative Labs; 800-988-5227)

Meanwhile, close competitor Media Vision also has added speech recognition to its **Pro AudioStudio 16** audio card. Media Vision uses Dragon Systems' ExecuVoice engine, the same engine that's found in the Microsoft Sound System. It has a 300-word vocabulary that operates on all standard Windows applications, and you can add up to 32 other commands of your choosing. However, you can't teach it to recognize users who have accents. In addition, you can scroll the data in any Windows file and have the Pro AudioStudio 16 read the text back to you. A microphone and a Windows-based guided tour of the Pro AudioSpectrum 16 are included. ($349; Media Vision; 800-845-5870, 510-770-8600)

Last but not least, IBM is introducing **VoiceType Control for Windows,** Dragon Systems' software-only solution that can be used with any Sound Blaster—compatible audio card. You can add up to 64 voice commands to any Windows application in addition to the built-in commands already available for 21 Windows applications. ($129; IBM Personal Computer; 512-473-8000)

THE LATEST UPGRADES TO PRODUCTS YOU USE

BY MIKE HOGAN

Equity 4

Epson has replaced its Equity line of desktops with a family of three entry-level models that feature a small 15-by-16½-inch footprint and processor upgradability via zero-insertion-force sockets. The new Equity 4 line includes a 486SX/25 equipped with 4MB of RAM, a 120MB hard drive, and an Extended VGA color monitor—as well as 486SX/33 and 486DX2/50 models. You can also upgrade virtual RAM from 512K to 1MB. ($1,548 for the 486SX/25 configuration; Epson America; 800-289-3776)

FaxMaster Server

FaxMaster, the first fax software to offer integrated bitmap compression (with a compression ratio of up to 33:1) and optical character recognition of low-resolution files, is now available in a server version. FaxMaster Server makes it possible for up to 25 networked users to share a single phone line and fax modem. The program has a security feature that enables users to broadcast a fax to a subset of users or send a private fax to a single individual. FaxMaster Server offers automatic queuing and redialing of outbound faxes. A fax administrator assigns individual passwords and fax priority levels, manages inbound and outbound fax logs, and can immediately print or distribute priority faxes or discard unwanted ones. FaxMaster Server requires a dedicated PC. ($695 for the server version and five user licenses; Caere Corp.; 800-535-7226)

Bravo for Green Thinking from AST

AST's new "green PC," the Bravo LP, isn't really green; the above model was created as a gag to highlight the power-conservation features of this small-footprint desktop. These buff-colored 486s use an estimated 40 percent less power and are available with 15-inch, low-radiation monitors. (Price unavailable at press time; AST Research; 714-727-4141)

Smartcom for Windows

Better late—and cheaper—than never: The price of the overdue Smartcom for Windows has been reduced from $149 to $49 at least through July, with competitive upgrades from other communications packages or upgrades from DOS versions still available for $49 after that. Announced a year ago, Smartcom for Windows was delayed in order to permit the inclusion of a graphics-interchange-format image viewer for inspecting files downloaded from bulletin boards. Other features include a row of smart buttons at the bottom of the screen for frequently used commands, and Hayes's SCOPE language for creating scripts of multiple tasks by writing or recording them. (Hayes Microcomputer Products; 404-441-1617)

Harvard Graphics

Software Publishing Corporation offers a twist on competitive upgrades: the software-back guarantee. If you aren't satisfied with the new Harvard Graphics 3.0 for DOS and Windows, Software Publishing will give you a competitor's desktop presentation package. The choices include Microsoft PowerPoint, Lotus Freelance, and WordPerfect Presentations for DOS, but not Aldus Persuasion or numerous other desktop presenters. This offer is good for 60 days following purchase and runs through the end of this month. ($595; Software Publishing Corp.; 800-336-8360, 408-988-7518)

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21. DESKTOP PUBLISHING You don't need another program to make things look great. Not when WordPerfect brings you advanced features like drag-and-drop text and graphics, customizable borders, even contour wrap-around text!

54. QUICKFINDER Now you can index files and with one key word or phrase, locate files instantly.

277. WYSIWYG EDITING With WordPerfect, you don't have to switch to "print preview" to see text, graphics, attributes — even headers and footers — exactly as they'll end up on paper. It's the way you can work all the time.

37. SCALABLE FONTS For the sharpest, clearest typefaces possible, WordPerfect 6.0 displays and supports TrueType®, CG Intellifont, Bitstream Speedo® and Type 1 font technologies.

315. SPREADSHEET FUNCTIONS Now you can actually crunch numbers while word processing. Because nearly 100 spreadsheet functions are built right into WordPerfect 6.0.

82. COACHES WordPerfect is easier than ever. But when you want to try something new, this is like having a personal instructor for quick advice or step-by-step instructions.

86. EXPANDED WINDOWING These days, nobody has the luxury of working on one thing at a time. WordPerfect 6.0 lets you open and edit up to nine documents at once.

238. SELECTABLE MERGE Once, merging data was a difficult all-or-nothing proposition. Now WordPerfect lets you easily select the records you want to merge into letters or reports.

143. ENVELOPES & BAR CODES Addressing envelopes and labels is about as fun as licking stamps. But now you can do it automatically, even adding bar codes to speed the mail along.

256. FAX FROM YOUR DESK Next time, don't take that hike to the fax machine. With WordPerfect and a FaxBios, Class I, II or CAS compliant fax board, you can fax right from your PC.

The other 629 new features and enhancements to WordPerfect 6.0 include its GUI interface, color printing and sound board support, collapsible outlines, Undo, Button Bar, Grammatik and macro conversion.

But no matter how many new features it has, one thing stays the same: it's still WordPerfect.

Which means all your present WordPerfect 5.1 files are fully compatible. And you have toll-free access to the best user support in the business.

Get the full details about WordPerfect 6.0 today.

Visit your local reseller, or for your free demo disk (along with a list of all 639 features and enhancements) just call (800) 228-2720 ext. 103.

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New!

BEST BETS

BY PRESTON GRALLA

PCContact

Great Windows Shareware for Hard Disk Cleanup, File Launching

Three great Windows utilities will help you with some of your computer-related chores. The first, CleanUp for Windows, helps you clean up your hard disk. It finds files with duplicate filenames, BAK files, and files of zero bytes, and then lets you delete unnecessary files. The program also shows you, in graph form, the directories that take up the most space, so that you can target them for pruning. CleanUp for Windows is available on PC/Contact as file CLENUP.ZIP in data library 3 (Utilities/Misc.). Or you can order it for $29.95 from the manufacturer; contact Foley Hi-Tech Systems, 185 Berry St., San Francisco, CA 94107; (415) 882-1730.

The other two utilities help you launch files quickly. WinFast lets you display your applications as icons on a button bar for easy launching. It also lets you arrange Program Manager groups into icons on your desktop. You can download WinFast as file WINFST.ZIP in data library 3 (Utilities/Misc.). Or you can order the software directly from the manufacturer for $15 by contacting Art Ullman, P.O. Box 17474, Fort Worth, TX 76102; (817) 265-9338.

If you just want a button bar that you can click on to quickly launch apps, check out QuiClick, which lets you define up to 25 buttons. It sits as a horizontal or vertical toolbar anywhere on the desktop. You can download QuiClick as file QUICLK.ZIP in data library 3 (Utilities/Misc.) or order it for $15 directly from the manufacturer by contacting Kempton Software, P.O. Box 8128, Lima, OH 45802.

Unbeatable Bargain On CorelDraw 3.0

For a great all-around graphics package at a low price, check out this deal from Corel: You can get the award-winning CorelDraw 3.0 for the remarkable list price of $199. Version 3.0 includes draw, paint, and presentation capabilities, as well as sophisticated features such as auto-tracing. It also comes with a complete library of clip art, fonts, symbols, and more. At about $400 less than Version 4.0, Version 3.0 is a bargain that's not to be missed. Call Corel at (800) 836-3729 for details.

Special Half-Price Offer on Stacker 3.1

Looking for a great, cheap way to double your hard disk space? You can get the Stacker 3.1 Special Edition for DOS and Windows compression software at half price—$49.95—until the end of the month. Even if you use DOS 6.0's DoubleSpace compression utility, you can still use Stacker 3.1. It includes the Stacker Tuner, which lets you adjust Stacker's speed and compression ratio.

For more details, call Stac Electronics at (800) 522-7822 for details.

Speedy Fax Modem With Comm Software

Here's your chance to get a low-cost, high-speed fax modem, along with just about all the DOS and Windows communications software you'll ever need. Supra is selling a 14,400-bit-per-second fax modem with Winfax Lite Windows fax software, FaxTalk DOS fax software, Windows and DOS versions of Comit data communications software, and Windows and DOS versions of the CompuServe Information Manager. The internal version of the fax modem is $299.95, and the external version costs $379.95, but if you shop around you should be able to knock a substantial amount off those prices. Call Supra at (800) 727-8417 for details.

BEST SOFTWARE BUYS

Where can you get the best software deal? Usually through the mail. We surveyed mail-order houses and came up with the best prices we could find. The following prices include shipping and handling charges but not credit-card surcharges. Prices are as of press time and are subject to change.

PRODUCT	LIST PRICE	BEST PRICE	SOURCE
DOS 6.0 upgrade	$99.95	$39.00	PC Zone, (800) 252-0386; or CompUSA, (800) 451-7638
Excel 4.0	$495.00	$292.00	Computer Discount Warehouse, (800) 473-4239
Lotus 1-2-3 Plus 3.4	$595.00	$305.00	ComputAbility, (800) 558-0003
Microsoft Word 5.5	$450.00	$209.00	Software Add-Ons, (800) 695-8088
Norton Utilities 7.0	$179.00	$104.78	Computer Discount Warehouse, (800) 473-4239
QEMM-386	$99.95	$59.34	Lomo, (800) 369-2846; Computer Discount Warehouse, (800) 473-4239; or Software Add-Ons, (800) 695-8088
Quattro Pro 4.0	$495.00	$89.00	Lomo, (800) 369-2846
Windows 3.1	$149.00	$86.99	Computer Discount Warehouse, (800) 473-4239
Word for Windows 2.0	$495.00	$288.86	Computer Discount Warehouse, (800) 473-4239
WordPerfect 5.1	$495.00	$268.00	Lomo, (800) 369-2846
WordPerfect for Windows 5.2	$495.00	$268.00	Lomo, (800) 369-2846

Introducing PacificPage 4. The latest addition to a very prominent family.

The latest member of the award winning PacificPage® family has arrived. Called PacificPage 4, it's designed just for the new LaserJet® 4 printer.

Like all of its earlier family members, PacificPage 4 provides full PostScript® language emulation. The same 35 Apple® LaserWriter® scalable typestyles. And all of PostScript's powerful graphics capabilities. It also accepts downloaded Type 1 and 3 font formats.

Just install the SIMM module into any of your printer's memory slots. With 4 MB of additional printer memory, PacificPage 4 can print your PostScript output at an impressive 600 dpi resolution. You'll get sharp, crisp output that you'd expect only from an expensive, high-end PostScript device.

And your PostScript files will be printed quickly because PacificPage 4 utilizes the i960™ processor built into each LaserJet 4.

If your printer is on a network, you never have to worry about confusing the printer with PCL and PostScript files.

PostScript language emulation for the LaserJet 4

That's because PacificPage 4 fully supports the automatic language sensing and switching feature of the LaserJet 4.

Like all of the PacificPage products before it, PacificPage 4 is covered by a full lifetime warranty and is backed by a 60-day money back guarantee of satisfaction.

With all of these impressive features and capabilities, you'll be surprised to learn that PacificPage 4 is priced at a low $299. Although, if you're familiar with PacificPage 4's predecessors, you know that high quality and low price run in the family.

For the dealer nearest you or to order PacificPage 4, call (619) 625-3627 Fax (619) 552-0889.

Be sure to ask about Pacific 4 SIMM Memory™ — 1, 2, 4, and 8 MB memory upgrades for the LaserJet 4.

PACIFIC DATA PRODUCTS

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Software Saleswire

WordPerfect is still king of the word processing hill, at least in terms of sales. This month's cover story includes rigorous tests of WordPerfect 6.0—the brand-new update to this venerable DOS word processor. The new version includes a graphical interface and QuickFinder, the text-retrieval and file-management tool built into WordPerfect for Windows. A grammar checker and collapsible outlines are also new. For more information, see our cover story or call WordPerfect at (800) 451-5151.

Businessware

Jun	May	
1	1	**WORDPERFECT 5.1 FOR DOS** (WordPerfect) Word processing is easier than ever with pull-down menus, mouse support, tables, an equation editor, and spreadsheet links. $495.
2	5	**MICROSOFT ACCESS** (Microsoft) Allows your work group visual access to data and provides simple, direct ways to work with information, regardless of format or location. $99.
3	2	**WORDPERFECT 5.2 FOR WINDOWS** (WordPerfect) Offers new and improved features; supports e-mail, Adobe Type Manager, Grammatik 5, and QuickFinder. $495.
4	9	**WINFAX PRO 3.0** (Delrina Technology) Fax communications for Windows. Features annotation and drawing tools, a cover-page designer, a phone book, and document management. $129.
5	3	**PARADOX FOR WINDOWS** (Borland) Develop database applications to suit your work. Ideal for novices, yet has sophisticated options for power users and professional programmers. $139.95.
6	8	**OFFICE FOR WINDOWS** (Microsoft) Includes Microsoft's fab four: Word 2.0, Excel 4.0, PowerPoint 3.0, and Mail for networks. $750.
7	-	**MICROSOFT PUBLISHER** (Microsoft) Create professional newsletters, forms, reports, greeting cards, and invitations. PageWizards interactive design guides help you customize documents. $199.
8	6	**QUATTRO PRO FOR WINDOWS** (Borland) This program uses a tabbed-notebook metaphor so that users can break complex spreadsheets into easy-to-manage pieces. $495.
9	-	**LOTUS 1-2-3 3.4** (Lotus Development) The latest upgrade of this DOS spreadsheet is faster and easier to use. SmartIcons speed frequent tasks and graphics are improved. $595.
10	-	**IMPROV FOR WINDOWS** (Lotus Development) Dynamic views let you rearrange, hide, show, collapse, and expand spreadsheets in seconds, letting you slice and dice information. $495.

Personalware

1	1	**QUICKEN 6.0 FOR DOS** (Intuit) Financial reporting on assets and liabilities, receivables and payables, and profits and losses. For small businesses and home users. $69.95.
2	8	**THE PRINT SHOP DELUXE** (Broderbund) Offers more than 300 graphics, plus 30 scalable fonts, an array of headline effects, and dozens of layouts. $79.95.
3	-	**RESUME FOR MICROSOFT WORD** (Swifte International) This collection of more than 50 templates for professional résumés installs seamlessly within Microsoft Word. $49.95.
4	-	**CALENDAR CREATOR PLUS** (Power Up) Keep track of where you're supposed to be and when you're supposed to be there. $59.95.
5	7	**QUICK AND EASY FOR THE SF-171** (DataTech) Create an Application for Federal Employment-SF171, keep it up-to-date, and customize it for specific jobs. $49.95.
6	3	**QUICKEN 2.0 FOR WINDOWS** (Intuit) Organize finances with automatic data entry, financial-planning calculators, credit-card checking, a pop-up calendar, and more. $69.95.
7	-	**QUICK BOOKS** (Intuit) Small-business accounting tasks are completed automatically and transactions are recorded on familiar forms. Includes QuickTrainer, a proactive help system. $139.95.
8	6	**TURBO TAX FOR DOS 1040** (ChipSoft) Calculate tax returns in seconds using pull-down menus and expanded help features. Entries are automatically posted to more than 50 IRS-approved forms. DOS. $79.95.
9	10	**THE NEW PRINT SHOP** (Broderbund) Includes 300 graphics, 30 scalable fonts, and layout templates. Customize your creations with fills, outlines, and shadows. $59.95.
10	-	**QUICKPAY** (Intuit) Maintains employee information and calculates withholding taxes. Works with Quicken. $59.95.

These software charts are compiled once each month by G. Meier, Inc., which gathers ranked-order sales information supplied by the following software industry sources: 800-Software; ABCO Distributors; American Software; Bobbages; Baker & Taylor Software; Compuadd; CompUSA; Daisytek; Dustin Discount Software; Electronics Boutique; Ingram-Micro; Kenfil; Merisel; Micro Warehouse; Multiple Zones; Navarre; PC Connection; Software, Etc; Software Resource; Software Spectrum; and Waldensoftware. They represent sales through tens of thousands of resellers. A weighting system is applied to each entry based on three factors: the entry's position in the individual chart, the power of the contributing source based on annual gross sales, and the relative strength of a source in a given category of software. All prices are suggested retail and are subject to change.

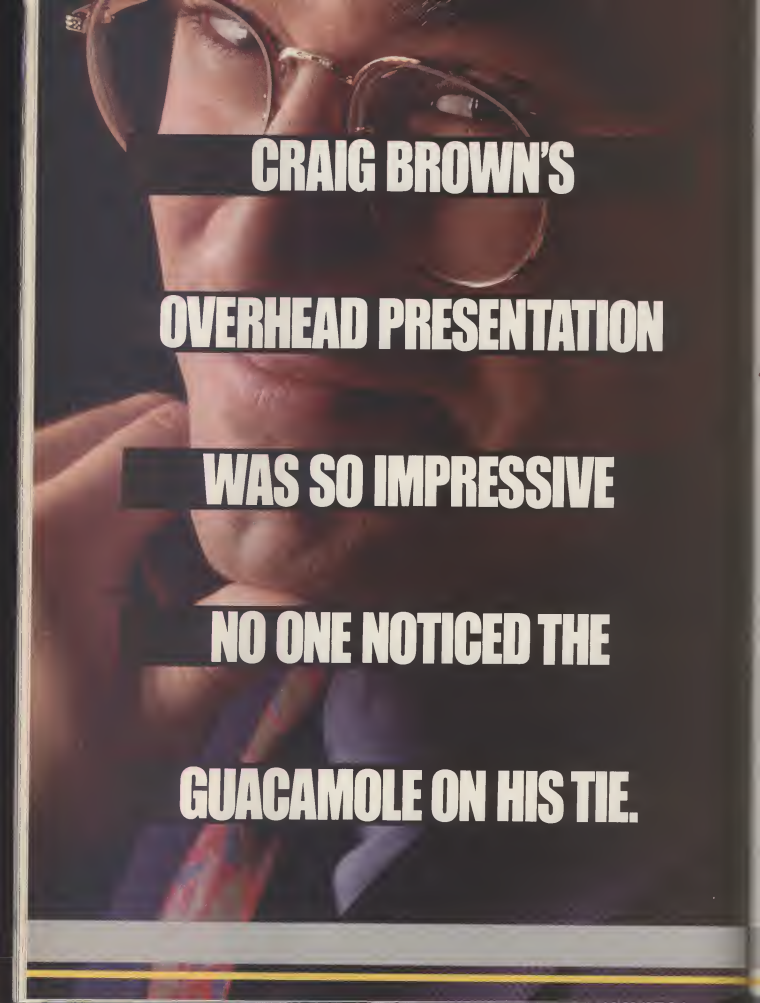
Utilities

Jun	May	
1	1	**MS-DOS 6.0** (Microsoft) Features integrated compression and easy-to-use memory management, as well as backup and virus utilities for MS-DOS and Windows. $129.95.
2	2	**WINDOWS 3.1** (Microsoft) Exchange text, numbers, and graphics freely between applications with this graphical multiple-application environment. $149.
3	3	**QEMM-386** (Quarterdeck) Expands the memory of 386 machines beyond the 640K barrier, thus speeding up the performance of spreadsheet and CAD programs. $99.95.
4	7	**NORTON UTILITIES 6.0** (Symantec) Norton's DOS-based diagnostic tools include the Disk Doctor, which analyzes and reports on damaged disks, then revives, repairs, restores, or reformats them. $179.
5	-	**DR DOS** (Novell) Makes your PC easier to use while maximizing the capacity and speed of your hard disk. Also, it keeps your system and data secure. $99.
6	-	**OS/2 2.1** (IBM) This OS/2 upgrade supports Windows 3.1 and 32-bit graphics, and comes with built-in multimedia features. $225.
7	-	**SABER LAN WORKSTATION NODE** (Saber) A front end with management utilities for Novell NetWare. $79 per node; competitive upgrade, $29.
8	8	**LANTASTIC/AI** (Artisoft) A RAM-efficient, peer-to-peer network operating system that takes as little as 12K per workstation and 40K per server. $99 per node.
9	6	**AFTER DARK FOR WINDOWS** (Berkeley Systems) Pick from more than 30 screen savers, includes a screen-locking security system, digitized sound effects, and slide-show displays. $49.95.
10	-	**WINDOWS FOR WORKGROUPS** (Microsoft) Share files, applications, and printers with networked co-workers. NetWare compatible. $249.95.

Learningware

1	-	**MARIO TEACHES TYPING** (Interplay) This animated tutor takes the fear out of learning to type. Students progress through three levels of difficulty. $39.95.
2	2	**DINOSAUR ADVENTURE** (Knowledge Adventure) Designed for children ages 3 and up. Dinosaur movies have stereo sound and are shown in real-life settings. $49.95.
3	-	**NEW MATH RABBIT** (Learning Company) An animated and colorful upgrade that teaches math skills to children ages 4 through 7. $49.95.
4	-	**WHERE IN SPACE IS CARMEN SANDIEGO?** (Broderbund) Explore space in a Cosmohopper 911 Turbo while you pursue Carmen. Learn about astronomy and space exploration. $79.95.
5	-	**LEARN TO COUNT/LEARN THE ALPHABET BUNDLE** (Optimum Resource) Preschool learning in an entertaining environment. Bundled, $39.90; individually, $19.95.
6	-	**LEARN TO USE DOS** (Individual Software) Provides users with lessons, practice exercises, and quizzes. $29.95.
7	-	**BODYWORKS** (Software Marketing) A reference tool for medical students, institutions, and individuals. Includes information on first aid, general fitness, sports injuries, and common illnesses. $79.95.
8	-	**TREASURE COVE** (Learning Company) Features more than 300 problem-solving questions that test science, reading, and math skills. For children ages 5 through 9. $59.95.
9	-	**NEW MATH BLASTER PLUS** (Davidson) High-resolution graphics, animation, and color help make learning addition, subtraction, division, multiplication, fractions, decimals, and percentages fun. For children ages 6 through 12. $49.95.
10	-	**READER RABBIT 2** (Learning Company) Four animated games help develop fundamental reading, spelling, and thinking skills. For children ages 3 through 7. $59.95.

Surprise! After a delayed release, IBM's OS/2 2.1 stormed quickly into the Top 10, earning the No. 6 slot for sales in June. This upgrade to OS/2 2.0 (see New! review, page 36) fixes some bugs, and more fully integrates OS/2 with DOS and Windows 3.1. OS/2 2.1 runs both Enhanced-mode and Standard-mode Windows applications, and 2.1 users can operate in the Workplace Shell or in the DOS environment. The new OS/2 is also designed to better accommodate portable-computer and multimedia users. It supports the Advanced Power Management standard and the PCMCIA specification, it features new multimedia extensions, and it supports CD-ROM, pen computing, and SCSI devices. For more information, call IBM at (800) 426-3333 or (914) 765-1900.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Circle 247 on reader service card.

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The Servant Becomes the Master: The Computer Is Killing Us

I'LL GIVE MY WIFE CREDIT FOR THE CONCEPT, ALTHOUGH recent observations were leading me toward it, too. Whatever the case, the conclusion is the same: It's possible that we can no longer keep up with the taskmaster we've created. In short, computers are killing us.

They're taking away our time and damaging us physically as well as emotionally. The most obvious example of injury is carpal tunnel syndrome. This is where my wife comes in. She almost came down with symptoms after working a rigorous typing schedule a few months back. "Is it possible," she asked, "that the demands of the computer are now beyond what the human body can handle?"

I'd never heard of carpal tunnel syndrome until a few years back when it started to crop up all over the place. Most news organizations now have committees to deal with the problem because it has become a plague in the newsroom. People have been pounding on keyboards for years, but never before was this weird problem an epidemic. Years ago, a reporter would slowly crank out a story. It would be edited with a pencil and sent to a copy boy who would take it to an editor or to someone to retype it. It was a convoluted process, and a silly one in light of the editing revolution that computers have ushered in. Today's writer is a machine that often pushes the limit of human capability.

Global Stress

It turns out that the frenetic work pace forced on writers is not an isolated trend. I was at the IBM research labs in the United Kingdom and saw an amazing product that presages the future. I was shown a software package that controls large-scale PBX switching gear for telemarketing. It was designed to let the computer dial phone numbers concurrently and direct calls so that the caller was talking continuously. Instead of waiting for a phone to ring, the caller always had a recipient on the line. It was amazing. If two lines were ringing at the same time and both were answered simultaneously—just as the telemarketer went to the first line—the computer would hang up the second within microseconds and redial it later.

I could see how easy it would be to sell this to an organization: All you'd have to do is demonstrate how the telemarketers could double or triple their productivity as the computer cranked through the work of contacting the suckers. Talk about speed up!

I think of products like this and I'm sure that the rest of the world laughs at Americans and our productivity fanaticism. Our motto should be: We don't work smarter—we work harder!

More recently, I had lunch with a group from Motorola's Customer Owned Paging Operation in Boynton Beach, Florida, where they are working on something called Site Connect. Their pitch: It's within the office environment itself that most pagers are needed. People need pagers when they're away from their desks, roaming the halls, or hanging around the water cooler. Pagers free people from feeling guilty about roaming. Consequently, they'll roam more freely.

That's the argument, anyway. Motorola's product is another child of the computer revolution.

My suggestion for the product's name: Tether! These devices are used by employers to keep office workers at their virtual desks all day long! Can workers really maintain such an attachment? It's possible that the psyche of the individual requires getting away in some sneaky way to maintain mental stability. Has anyone studied the psychology of all this? Nope.

Leashed to the Computer

Too many computer products do nothing more than squeeze more work out of the hapless human leashed to the computer. There is software that lets employers spy on users remotely via the network. Most machines with built-in microphones let you turn on the microphones remotely, allowing employers to eavesdrop on the employees in their cubicles. TV cameras are the next tool in that game. Numerous programs count keystrokes so each day's work can be analyzed. And there's more to come.

The irony is that computers should liberate office workers and put them in the field where they can work from Bermuda or London or anyplace else with a modem jack and a power cord. But apparently this trend is too healthy! It seems that now we expect people to work like assembly-line slaves from the 1920s.

The irony is that computers ought to liberate office workers.

Then, as now, the fact that people are not machines was lost on researchers and employers. You can't push a "fast" button on employees. They start to fall apart. Or they rebel and wreck the place.

When we view people as machines, job enrichment and personal growth suffer. Under such conditions, employees will not contribute in any significant way to the welfare of the company. Too many employers don't seem to care about such lofty ideals and pay only lip service to these concerns. Their actions seem to say: "Let the computer work these people to death. Who cares? Computers can help us make sure people do their jobs!"

Congratulations to the computer. All that's missing are the welts from the whipmaster's lash. Back to work, dawdler!

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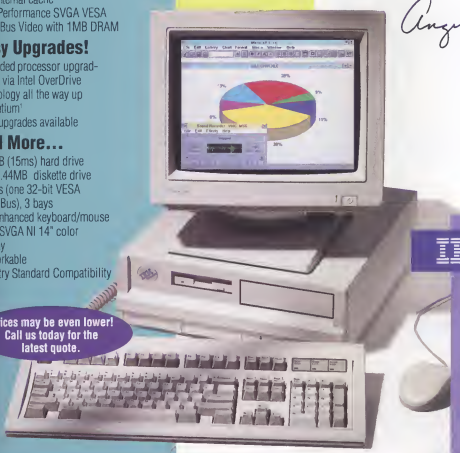

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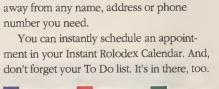

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The Pain and Torment of Pentium Envy: One Man's Story

I WAS PADDING AROUND MY HOUSE THE OTHER MORNING waiting to wake up enough to shave. You can't shave with your eyes closed, you know. Guys who do so often take their first morning meeting with a little tab of toilet paper flapping from the end of their chin. Nobody ever gave somebody who looked like that a million-dollar piece of business. At any rate, I was sort of standing there by my desk, thinking about whether Visio was useful for anything except organization charts and contemplating whether I should leave at least one large partition uncompressed. My eye fell on a magazine that was sitting on top of my scanner and it hit me—my first stab of Pentium envy. And it hurt. The only other time I felt like that was when I was sixteen and saw Jennifer Tagliatti in her cheerleader uniform. I still get kind of choked up thinking about that.

Anyhow, I stood there in my underwear and stared at my venerable 486/33, stuffed with presentations and spreadsheets and two years of crushingly tedious homework, and for the first time I felt that I had . . . tiny MIPS.

There was a time when I felt like I had huge MIPS. Certainly my MIPS were bigger than anybody's on my block. The charts didn't lie. There were my friend Greg's plain old 286 MIPS, and they were stumpy and pathetic, as befits an attorney, nothing you'd feel comfortable showing off in a health club sauna or something. My buddy Finster had 386-size MIPS, which were really all he needed as an executive vice president, and our chairman didn't even have any MIPS at all—he lets his secretary handle them for him. But me? My MIPS were always over to the rightmost part of any chart, a towering obelisk of speed, power, and just plain good old-fashioned size.

Now, I didn't know. My MIPS felt . . . shriveled. I looked again at the magazine. There were several MIPS measured there, and mine were on the leftmost part of the chart, right next to the cauterized stub that said "AT." To the right were respectable spires designating the 486/50 and the 66DX2. And there, all the way over, was the proud, upstanding Pentium. Boy, that chart put things in perspective. These were my MIPS we were talking about. As a power wonk, I could demand no less than the very biggest.

So why not buy one? But . . . what for? I'm getting along fine with my present MIPS level. What possible need could a person like me have for such raw, unmodulated force? Just look at the heft of that instruction set! What rationale could I possibly offer to my two bosses—my wife and Walt?

Well, let's try these excellent reasons on for size:

I could make you very happy. I know you've been satisfied with me until now, but you ain't seen nothing yet. With an instruction preset buffer, multiple comfy caches, and a meaty branch prediction unit determining which of my pipelines can most efficiently carry the prevailing freight, I will be massively responsive to your needs. Just you wait and see. Have I ever promised more than my operating system could deliver? Give me this shot and even I won't know what I'm capable of! Think of the adventure! The romance!

Time is money. Who can get enough of either? Not us! And with complex instruction support telling superscalar integer execution and pipelined floating point units how to execute complicated tasks, I'll be free to do all the little things we never had time for.

We'll be upwardly mobile in the nineties. Which of our friends and fellow workers can say the same in this disappointing and regressive decade? Sure, others will be able to pop the new chip into their old Overdrive sockets for some residual Pentiosity, but in a completely new machine, we'll be able to plug not one but two P-chips into mother and run two maximo processors simultaneously! Yabba-dabba-doo!

It's got a dedicated fan. People are so fickle these days. It's nice to think you can buy someone like that.

Don't blame me when we can't run tomorrow's programs. Now you're cool, sure, but later you'll be clawing and grasping just to keep up with the competition and there we'll be—behind the curve. There will be a new version of AutoCAD, for example, recompiled for the Pentium. OK, OK, I know I don't run AutoCAD, but I could! I might! And OS/2 will really come into its own, if we can ever figure out how to install it! And Windows NT will do all kinds of neat stuff that nobody can explain to me, but hey, people who succeed in the future will be positioned in the front lines for maximum throughput and minimum dragtime! You want that to be us, right?

You want me to be happy, don't you? There are other new processors out there. They're more expensive. And they involve RISC. That's a whole other lifestyle that just might invalidate all the hardware and software that's gone before, render it, you know . . . obsolete? I don't think you want me to set my feet down on that road, do ya? The cost in human and monetary terms could be exorbitant.

For the first time in my life I felt that I had . . . tiny MIPS.

The bus staps here. I won't bother you ever again. I swear. I know I said that about the XT, the AT, the 386, the 486/33, and the 50DX with local video parlor that would never be transcended, but this will be it. No kidding. This is the platform for the rest of the century! Please let me stand on it, just for a while. Please? Huh?

What do you mean, no?!

Well, then.

Could I have a puppy? ◪

PHOTOGRAPH BY RICHARD MORGENSTEIN

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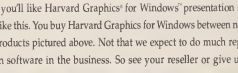

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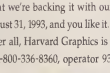

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SPC SOFTWARE PUBLISHING

Can Intel Stay on Top? Count on A Knock-Down-Drag-Out Fight

WHAT'S IT GOING TO TAKE TO KNOCK INTEL OFF THE TOP OF Microprocessor Hill? No one's found the silver bullet yet, but the 25-million-strong 486 processor market is too tempting to leave alone. All of a sudden, Intel is surrounded by pretenders to the throne and is being attacked by both *x*86 clonemakers and a breed of interlopers armed with newer RISC technology.

The first of the new attacks came from Cyrix's 486SLC, a hybrid that crammed 486SX power into a 16-bit 386SX microprocessor. The chip was little more than a bonus to laptop makers, who used it to eke the last dollars out of their 386SX motherboards. Cyrix's full 32-bit entry, called the 486DLC, hasn't made serious inroads in any market I know of, so the company will probably have to be content with less than 2 percent of the 486 market. And all of that share will be tied to a low-priced chip aimed at the declining market for 16-bit notebook PCs.

IBM also launched a move into the *x*86 microprocessor market last year when it developed enhanced versions of the Intel-licensed 386SX it was making for use in its own products. The IBM 386SLC added a cache to the original design, and the IBM 486SLC that followed enlarged the cache and doubled the internal clock speed of the chip. Originally designed only to upgrade IBM's own PS/2s, the 486SLC has been used in Big Blue's ThinkPad notebooks and has found markets outside of Big Blue's product lines.

IBM's market penetration Unfortunately, Intel's agreement with IBM requires that all IBM-manufactured chips be used in IBM products, which means outside vendors must use IBM motherboards. Nevertheless, IBM chips are springing up, mostly in entry-level products, but IBM's hot new "Blue Lightning" clock-tripling chip could move the market to a higher plane. But since IBM plans to honor the restrictions of the Intel contract, it's hard to envision an impact much greater than that of the Cyrix effort.

Advanced Micro Devices (AMD) is another story. On the heels of yet another legal victory over Intel, AMD launched its Am486 clone, including Intel-written microcode that virtually guarantees compatibility with Intel's products. Last year AMD lost a suit challenging the copyright that prohibited it from using that code, but a federal judge called for a new trial, ruling that Intel had withheld and altered trial evidence. AMD immediately abandoned efforts to launch a version of the chip that uses AMD-written microcode in order to gain quicker entry into the 486 market using the Intel microcode product. The company expects to capture about 5 percent of this year's 486 market and more than 15 percent of next year's larger market. AMD, together with IBM and Cyrix, could account for 20 percent of the 486 market next year.

When faced with competition in the past, Intel knew just what to do. When AMD launched the first serious clonemaking effort three years ago, its chip could have seriously damaged Intel's leadership position in the 386 market. So Intel fired back with a high-energy marketing effort that moved its then-new i486 product from its high-end position into the mainstream position occupied by the i386. As a result, AMD today enjoys the majority share of the declining, low-priced 386 market that Intel has all but abandoned.

But Intel can't use the same strategy this time. The new Pentium is not ready to become the mainstream processor of choice because the company can't manufacture enough of them. Also, one Pentium takes up the same space on a silicon wafer as five or more i486s. Intel has only committed to building "over one million Pentiums" in 1994, hardly enough to become desktop computing's new mainstream processor. Even if Intel lost 20 percent of its i486 market next year, it would gain only enough capacity to make about another million Pentiums. Intel could instead use the new capacity to increase production volume and move the Pentium to new, higher-density technology that would allow Intel to downsize its chip. Such a plant won't be ready until late in 1994—which makes 1995 the earliest possible date for Intel to make its Pentium move.

The Microsoft threat All of which makes Intel even more vulnerable to attack from newcomer Microsoft. Windows NT enables RISC-based PCs with processors from the likes of DEC, MIPS, and probably even Apple/IBM/Motorola to run Windows. That lets those microprocessors attack Intel despite the fact that they are not actually *x*86 clones.

How much of the i486 and Pentium markets can these high-priced RISC interlopers get? It's hard to say, but three phenomena could cause the new Windows-driven RISC market to be larger than you might think. First, PC performance hounds will stand in line to buy RISC-based products, even if they cost twice what Intel-based PCs cost and if the actual performance is not as great as their perceived performance. Second, many will be sold just because they're not Intel-based machines. And third, RISC vendors will sense Intel's increasing vulnerability and reprice their machines to seriously compete with Intel-based PCs, even if it means short-term losses.

Intel's past strategies for handling the competition won't work.

But don't count Intel out yet. It will be patient for a while. Then, if it has to, it will launch its clock-tripling i486/DX3. And then, if it has to, it will find and rent the high-density capacity it needs to build more Pentiums. And then, well . . . just count on a knock-down-drag-out, exciting fight. ◪

PHOTOGRAPH BY FRED STINSON

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Presentation Products: Slick Tools Or Gizmos for Digitized Flip Charts?

YOU'RE A BUSINESSPERSON, AND YOUR JOB REQUIRES THAT you make effective presentations. Now that multimedia software, muscular color notebooks, portable sound devices, and lightweight projection systems are here, everyone can produce top-quality presentations. Or can they? John and Paul once again battle it out.

SOMERSON: I've never seen a single decent presentation except at professional Vegas-style extravaganzas with Woodstock-size speakers and dry ice smoke effects, paid for—at huge expense—by companies like Apple and Microsoft. They're all just colorized, digitized flip charts. How about you, John?

DVORAK: Obviously you're not getting out enough. Or maybe you're getting out too much. Nowadays, with the desktop presentation tools available to public speakers, the potential for good work is quite high and the work often *is* good. This doesn't mean that everyone has jumped on the bandwagon. Many speakers still use overhead projectors. Do you have any examples of the poor presentations you've seen? Maybe your standards are so high that you're expecting too much.

SOMERSON: I think the real problem is that our standards are far too low. We sit through endless boring, sterile text screens, and just because someone slaps on a few bullets and an occasional chart, we're supposed to be mesmerized.

The reality is that a lot of businesspeople just aren't very good at communicating. They have something to say, but they aren't very good writers. Or designers. Or audio visual producers. So they end up with dry, long-winded messages in sleepy formats on geeky backgrounds. They don't know how to highlight important points or make things compelling. Then they wrap the thing in $20,000 worth of hot hardware, toss in a clichéd soundtrack, and expect us to fall over.

I blame the software. All the packages out there make it far too easy to slap together a boring, canned presentation. But none really helps the user communicate effectively.

DVORAK: Well what can you expect? Why blame the software for a boring speech? A boring person is a boring person no matter what the tools. I use video for many presentations. Full-motion video. Clips, gags, funny stuff sometimes. In fact there are a lot of nifty tools available for hot presentations. Your complaint is like shooting the messenger. Surely you aren't saying that you believe these new tools and devices make these guys *more* boring, are you?

SOMERSON: There are some nifty tools out there. But the truth is that average businesspeople don't want tools. They want assistants. Artist in a box. Gagster in a box. Speech writer in a box.

DVORAK: So what? There are good tools. Too bad these people can't use them.

SOMERSON: The mantra about tools is bogus, John. It's like telling someone who wants to build a house, "OK, here's a bulldozer, a power saw, some nail guns, and plumbing tools. Now go do it." What people really want are talented architects, carpenters, and electricians—not tools.

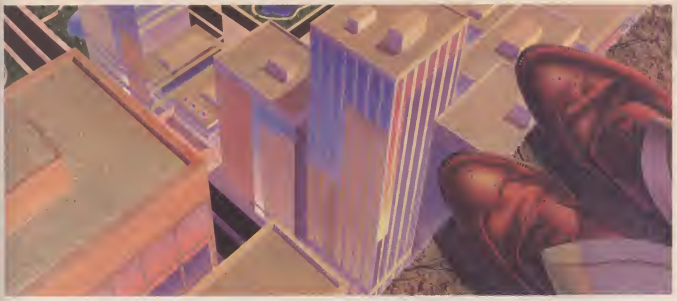
Same goes with presentations. What CEOs really want is software that asks them what their main points are, what data they have to support it, and what art they can use to illustrate it. Then it would show them clips of different kinds of gold medal presentations, ask them which ones they liked, build a custom profile, and then assemble their main points and supporting data into professional presentations. And it would let them add or remove gags, video clips, and sound, or incorporate attention-getting tricks like animated graphs.

Most presentation packages available today are just bulldozers. In the hands of most businesspeople, the output is virtually identical—and sleep inducing. You know the drill: The lights go down, the fan on the overhead projector starts to whir, the bulleted lists start sliding by in slow succession, and suddenly it's nap time. If you throw in video and sound, it gets boring and embarrassing. Most people have a hard enough time with text; try to make them into movie directors, and they end up producing real drivel. And they waste huge amounts of time in the process.

DVORAK: Sheesh, Paul . . . are you looking for consulting work now? Maybe we should just take these boring executives out to the back lot and shoot them. What's your point?

SOMERSON: Gettin' a little trigger-happy there, pardner? First you're gunning for messengers, and now for executives. Lighten up a little. My point is that not everyone can be as creative as you, John.

PHOTOGRAPHS BY ELLEN ARANDOS AND RICHARD MORGENSTERN



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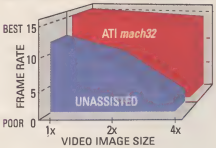

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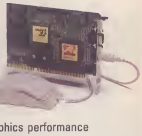

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Dvorak vs. Somerson

DVORAK: Gee, kudos from Mr. Patronizer.

SOMERSON: You're welcome, Mr. False Humility. Look—lots of businesspeople are terrific planners, or managers, or developers, or sales experts, but they can't write a gag or draw a straight line to save their lives. Today's presentation software works almost exclusively by brute force. These apps should have enough smarts to help boring executives come up with something nonboring, but they fall far short. Which is why we're forced to endure the same sad old digital slide shows. Or worse, slide shows overburdened with distracting wipes and fades, and saddled with clumsy video and blaring, goofy sound.

It's not a question of tools. All executives have the same PCs and word processors that you have, John; with such powerful tools, how come they can't write as well as you?

DVORAK: Are you saying the tools are just a waste—an exercise in futility—and perhaps specialists should do the job instead? Well, I can almost agree with you. But I hark (yes *hark*) back to the arguments against giving computer users access to typesetting technology. "Oh, God! If they ever learn about fonts we are doomed to looking at the ugliest combinations of mismatched tasteless fonts." People ranted about how the average user, whether a clerk or an executive, would butcher good taste when given the opportunity. Fact is, it hasn't happened. People see that they have the opportunity to look good, and they make a point out of not embarrassing themselves. Same for public presentations.

SOMERSON: You're finally catching on, Dvorak. Specialists are exactly what we need, but they should be embedded in the software. And you're wrong about DTP as well (why am I not surprised?). Why do you think the first Microsoft app to offer Wizards—expert built-in layout help from specialists—was Microsoft Publisher? Why do you think that PageMaker and QuarkXpress are used mostly by designers, not executives? Maybe you don't see the reams of garish, buckeye botchjobs that we do. This is what happens when solid companies like Bitstream flog stuff like Flintstones and Star Trek font packs. How did we ever get by without typefaces featuring Dino, Wilma, and Bamm Bamm, or Klingon symbol sets? Good grief. And that's just with static text. Ask the average overstressed executive to do a polished, persuasive job with animation, sound, and video, and you usually end up with a dog's breakfast.

Presentationally challenged execs need help—but it should be embedded in software.

DVORAK: Oh brother. You and the Wizards nonsense (and again with this Microsoft boosting). There are no Wizards for DTP—give me a break. People do a little research and then produce good work. I have seen some of the most boring people do well with these new tools. They are still boring, but the presentations make them seem livelier than they would have seemed without the tools. I don't think you've witnessed this stuff in use or else you've just had a couple of bad experiences. Let me ask you: How can this hurt?

SOMERSON: You must be joking. Sometimes we see several of these a day. They're awful. Humiliating. They can hurt because they detract from the message. They become unintentionally funny. Let's see—which numbingly different fade pattern are they going to use next screen? When do we get to the *Chariots of Fire* or *Rocky* theme music? Is the upcoming comic-relief slide going to feature Bill, Mitch, and Philippe, or Larry, Curly, and Moe? It's the presentation equivalent of ransom-note typography. Better software would prevent this. Brute force apps foster it.

DVORAK: Nonsense.

SOMERSON: Sorry, but it's true. Just look at all the tacky, inelegant twaddle that well-meaning businesspeople grind out. And since virtually no executives actually create professional-quality movie scenes or music themselves, they just rip it all off—steal a few frames from the videotape or a few bars from the CD. For a presentation in your office, who will know? The market should be filled with CD-ROMs full of classic video clips where the royalties and rights have been taken care of.

DVORAK: Oh, pul-leeeeze. Now you're the spokesperson for the movie academy. A defender of Paramount. First these guys are dreadfully dull, now they're bootlegging good stuff. Or I suppose they're bootlegging bad stuff by your way of thinking. I think it's amazing that you can use a movie clip at all with the new software. It's phenomenal.

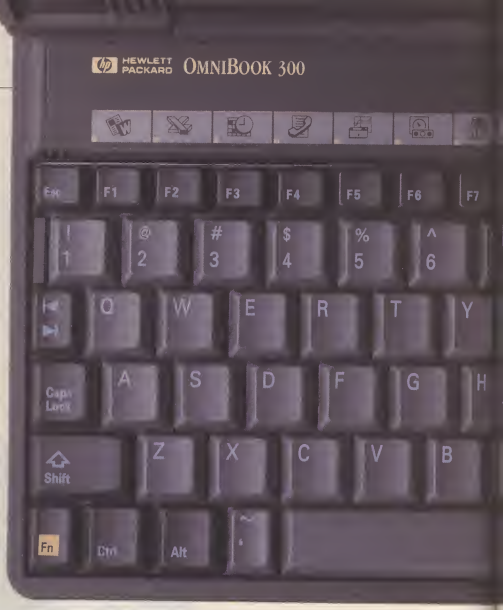
SOMERSON: Phenomenally hard, you mean. John, it's tough enough for most executives to write snappy text or come up with the best graph to illustrate their point. Do you honestly think most businesspeople can produce masterful presentations with today's clunky multimedia tools?

DVORAK: If they can easily rip off Hollywood, then it's effortless. I use these tools—namely the good old Video Toaster—when I make elaborate presentations. Let me finish this discussion by asking you what *you* use when giving a talk? Or is this stuff all crap to you, and do you just yell at the audience?

SOMERSON: We bought IBM ThinkPads as presentation platforms; they're great machines with fabulous screens, especially the new 720Cs with PCMCIA and larger hard disks. When we get the latest and greatest stuff we try it out ourselves in the real world. A few products stand out. Sharp's top-of-the-line projection screens. The whole range of Acoustic Research add-on speakers. Autodesk's cool but pricey high-end software. New state-of-the-art apps from Asymetrix (especially Multimedia ToolBook and Compel) and Adobe are also very hot. So are Gold Disk's Video-Director, Autodesk's Animator Pro, and Studio Magic from Brown Wagh.

But the bottom line is that this stuff lets pros do great work, but there really isn't much out there for the average, presentationally challenged exec. It sure beats acetates on an overhead projector, but it's still far too hard for most of us to create compelling pitches with video and sound. The first package that makes it as easy as having a creative, talented assistant will become the next monster app. ◪

Hewlett-Packard and Microsoft are about to change the way business travelers work.



***Dimensions** (closed): 1.4" high x 11.1" wide x 6.4" deep.*

***Weight:** Less than 3 pounds; flash disk model lighter.*

***Processor:** 386SXLV CPU.*

***Display:** 640- x 480-dot VGA; 9-inch LCD; 16-level gray scale.*

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Actual size ▸

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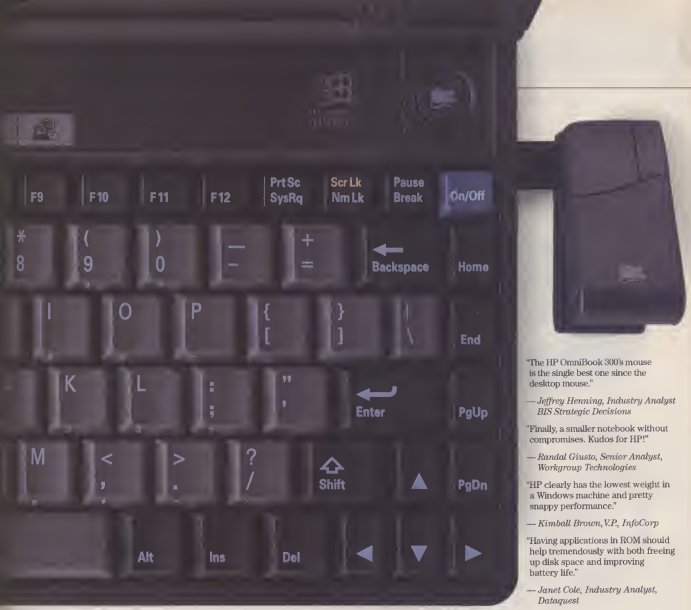

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WordPerfect 6.0

Is this the last DOS application that matters?

Listen up, WordPerfect users. All 13 million of you have been drumming away on the same word processor *since 1989*. In the hypercompressed geologic time scale of PC software, WordPerfect 5.1 for DOS has been around since roughly the Jurassic era. And now that WordPerfect 6.0 for DOS has finally arrived, we hear you asking just one question: Should I upgrade?

For once, the answer is crystal clear. The new release includes so many enhancements and new, killer features that for current users of WordPerfect 5.1 the decision is a no-brainer. WordPerfect 6.0 is worth every penny of its $129 upgrade price. Get it. And don't think twice if your department has PCs that can't quite run Windows and your staff is clamoring for the cool buttons, slick graphics, and usability improvements found in Windows programs—just get it.

But WordPerfect 6.0 appeals not just to users of last year's hardware. It is as powerful as any word processor ever created for DOS or Windows. Many of its features should be standard on all word processors—and probably will be, as soon as its competitors can steal them. And its two new graphics modes will silence any critic who's ever scoffed at WordPerfect's text interface.

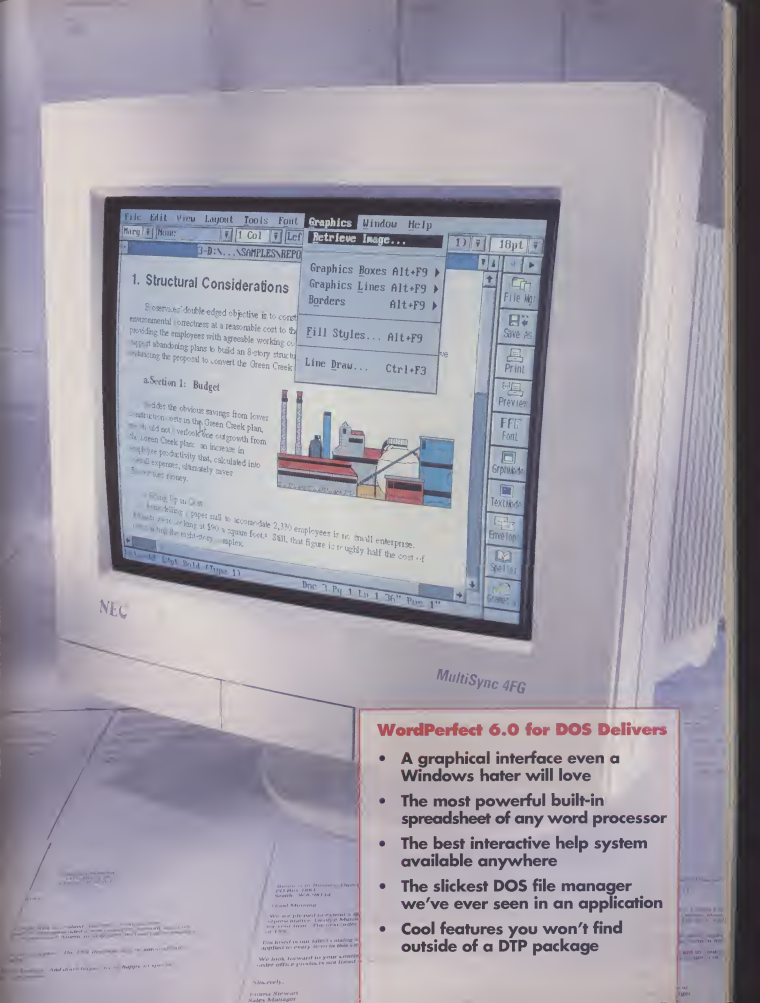
On the other hand, if you've already moved to WordPerfect for Windows, you're better off staying there—although that's not so clear-cut. The new DOS version does a fine job of linking with spreadsheet data, and you can send faxes without exiting the program. But while WordPerfect 6.0 for DOS does a great Windows impersonation, it's *not* Windows. You don't get Windows' consistent interface and smooth interaction between applications. So, if you're a WordPerfect for Windows user, hold off until WordPerfect releases Version 6.0 for Windows, complete with all the features in the DOS version, at the end of this year.

Now, there is one other person who must get WordPerfect 6.0 for DOS: the curator of milestone software for the Boston Computer Museum. WordPerfect 6.0 will be remembered as the last great DOS program before the total reign of Windows. No other recent DOS app

How does WordPerfect 6.0 stack up against the leading Windows word processors? See our face-off, "War of the Words," on page 124.

BY RON WHITE

PHOTOGRAPH BY ROBIN GINSBERG



WordPerfect 6.0 for DOS Delivers

- A graphical interface even a Windows hater will love
- The most powerful built-in spreadsheet of any word processor
- The best interactive help system available anywhere
- The slickest DOS file manager we've ever seen in an application
- Cool features you won't find outside of a DTP package

even comes close to packing as much firepower as this one—and let's face it, DOS programs are a dying breed. There's an excellent chance that this is the last-ever DOS version of WordPerfect.

WordPerfect Corporation does plan to make the inevitable migration into Windows' promised land as comfortable as possible. WordPerfect 6.0 has one foot in the DOS text world and the familiar traditions of WordPerfect 5.1; its other foot is in Windows-styled graphics and conventions.

Three Customizable Interfaces

WordPerfect 6.0 cushions the transition to Windows by offering both text and graphical interfaces. In text mode you can retain that familiar WordPerfect bare-bones look or customize the screen for ease of use without the graphics overhead. You can create drop-down menus, button bars, document frames, and vertical and horizontal scroll bars in text mode by using text characters rather than graphical elements. As in 5.1, typefaces and type sizes are distinguished by colors, and illustrations are indicated by empty boxes. And as in most DOS apps, the small rectangular text pointer is awkward to position with a mouse. But on the whole, even in text mode, 6.0 is far easier to use than 5.1.

Those ready to plunge into the graphics deep water can choose from two graphics modes, both of which closely imitate the Windows look. One of these editable Wysiwyg modes displays headers, footers, footnotes, and other page elements in the margin, while the other hides them. To quickly compare the different modes with the WordPerfect 5.1 interface, see "The Three Interfaces of WordPerfect 6.0" on page 113.

In either graphics mode, you can zoom the page from 50 to 300 percent of the original, to the width of the page with or without margins, or to a full-page view. Text is editable from every zoom view. The graphical interface also brings scalable type to the DOS world, with support for thousands of fonts, including Adobe PostScript Type 1, TrueType, and Bitstream Speedo fonts, as well as Hewlett-Packard Intellifonts. The result is that WordPerfect for DOS documents can be typeface compatible with those created in WordPerfect for Windows.

The two graphics modes and the one text mode allow for complete customization of screen elements. The button bars, as in the Windows version, can include menu items, macros, or even another button bar, and you can identify buttons with icons, text, or both. However, the formatting ribbon doesn't allow point-and-shoot setting of tabs and margins as it does in WordPerfect for Windows. But that's about all it lacks.

That Familiar Touch

WordPerfect for DOS has long been abused for its idiosyncratic key assignments—F3 for Help, F7 for Exit, and Esc for repeating an action. In Version 6.0, WordPerfect finally adopts the standard help key—F1—and Esc becomes the key for WordPerfect's three levels of undelete. F7, though, is still Exit, and hitting Home, Home, up arrow still takes you to the top of a document.

Users whose fingers are ingrained with a memory for DOS WordPerfect menus will also need to adjust to the new menu structures. The Graphics menu, for example, has been streamlined, and Reveal Codes moves appropriately from the Edit menu to a new main menu choice, View.

Although they'll require some retraining, most menu changes are worth it. The word-count fea-

WHAT'S NEW IN WORDPERFECT 6.0

The Top 10 Additions and Improvements

New features and enhanced old ones give WordPerfect 6.0 more muscle; likewise, the new graphical interface, apparent in every feature, makes this version far easier to use than previous ones.

- **Customizable interface** with Text, Graphics, and Page modes that provide flexibility, true Wysiwyg editing, and a Windows-like environment.
- **Scalable fonts** as in Windows programs: PostScript Type 1, Intellifont, TrueType, and Bitstream Speedo.
- **Multiple open documents** onscreen—up to nine at once.
- **A bona fide file manager** that borrows QuickList and QuickFinder from WordPerfect for Windows.
- **98 spreadsheet functions** including powerful math functions that are directly accessible from within tables.
- **100+ macro commands** that function like a complete programming language but are edited like document text.
- **Interactive help** that provides real-time instruction with live data.
- **Connections** to the world—you can fax or e-mail from within a document.
- **Image-editing tools** such as fancy contour text-wrapping of illustrations.
- **Flexible outlining** that permits expanding or collapsing subsections of an outline from the menu or from a special button bar.

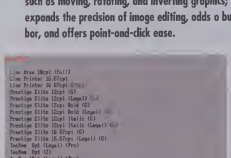
WordPerfect 5.1 and 6.0: Side by Side

The most popular DOS word processor gets graphical.

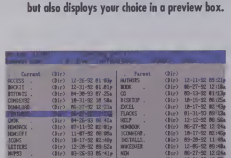
WordPerfect 6.0's new graphical interface dramatically changes the way you wark with text and graphics, and haw you communicate with the program. Direct manipulation and enhanced graphics make it easier to tap WardPerfect's power.

WORDPERFECT 5.1

Version 5.1 (left) supports basic image manipulation, such as moving, rotating, and inverting graphics; 6.0 expands the precision of image editing, adds a button bor, and offers point-and-dick ease.

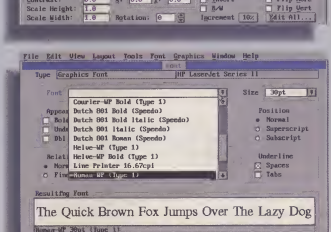


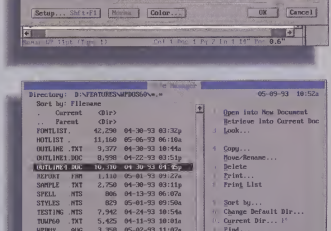
Version 5.1 offers only bit-mapped fonts and little help for selecting them; 6.0 not only provides scalable fonts but also displays your choice in a preview box.



The List Files feature in 5.1 is greatly expanded in Version 6.0, giving DOS users o full-blwn file monoger.

WORDPERFECT 6.0





WordPerfect 6.0

Speed Matters

New features and a graphical interface, too—won't that slow WordPerfect down?

When WordPerfect for Windows was introduced, scads of DOS WordPerfect users jumped to it and then jumped back as soon as they discovered that it was slower than a glacier. Subsequent releases of the Windows version have addressed the performance problems, but you're probably suspicious of yet another graphical interface, which by its nature takes more resources and more time.

In performance tests with the final beta version of WordPerfect 6.0, *PC/Computing's* technical staff found that 5.1 does print faster than both the text mode and the graphics mode of 6.0. But in real terms, the difference is probably not that noticeable: You'll wait less than 3 seconds after issuing a print command to print a four-page or ten-page document—which, by the way, is a lot less than you'll wait for WordPerfect for Windows or Microsoft Word. (See "Ami Pro Sprints to the Top," on page 139, for a complete comparison of performance factors.)

The real difference in printing comes when you print merge a ten-page file: With WordPerfect 5.1 you'll wait just a few seconds before you can begin work again; 6.0 takes a couple of minutes to return control to you.

WordPerfect 6.0 does perform a bit better than 5.1 in our text-manipulation tests, which analyze how quickly the program scrolls from the top to the bottom of the screen, jumps from one section of a document to another, and searches for and replaces a string of text. Surprisingly, these operations take exactly the same amount of time, whether you're in graphics mode or text mode.

There is a difference in how quickly these two modes perform basic file operations. The 6.0 text mode outperforms the graphics mode at opening and saving files—it's even faster than 5.1.

Overall, you don't gain any great speed advantages by upgrading to 6.0, but you don't lose any either. The bottom line: You get more features in an easier-to-use package with no significant drag on performance—so 6.0 wins hands down in the competition with 5.1.

Product	Printing Speed	Text Manipulation	File Manipulation
WordPerfect 6.0 (text mode)	25% Slower	3% Faster	5% Faster
WordPerfect 6.0 (graphics mode)	25% Slower	3% Faster	7% Slower
WordPerfect 5.1	Baseline	Baseline	Baseline

ture, for example, was once part of the spell-checker. Now it's found in a nifty Tools menu selection, Document Information, that tabulates not just the number of words in a document but also the number of lines, sentences, paragraphs, and pages, average word and sentence lengths, and the length of the longest sentence—a great way to get a handle on the complexity of your writing.

As always, the WordPerfect keyboard is totally malleable. You can modify the keyboard layouts, assigning any function, macro, or character to any key. The program comes with four keyboard layouts, including a Windows-standard Common User Access keyboard layout, another that has been customized for creating equations, and still another for accessing new and useful macros supplied with Version 6.0. For example, one macro provides templates for memos, letters, and fax cover sheets and accesses a database of frequently used names, addresses, and phone numbers. What the new DOS version lacks is a way to modify the menus, a great feature included in WordPerfect 5.2 for Windows.

WordPerfect 6.0 for DOS takes many of its cues from the Windows version's interface, offering such features as drag and drop for text and the ability to display up to nine documents at a time in full-screen, tiled, or cascading windows. But inexplicably, in some cases it ignores Windows' better ideas while still flouting WordPerfect 5.1's conventions. For example, a listing of the last four files opened—nonexistent in WordPerfect 5.1 and a File menu standard in the Windows version—is available in 6.0 only by pressing the down arrow from within the Open File dialog box. Similarly, the list of document windows is buried beneath two menu levels instead of being first-level selections under the Window menu, as Windows users might expect. Why the interface evolved in this direction is a stumper. It's neither intuitive nor a concession to 5.1 tradition.

Doing It Better

WordPerfect 6.0 isn't just a slick new interface, though. It also addresses a major weakness of DOS by integrating a sophisticated new file manager. From the 6.0 File Manager dialog box, not only can you open or retrieve files, you can also review their date and size, and sort them by name, extension, date, or size. And you can copy, delete, move, or print files; create directories; and preview the contents of files without opening them. All these

file-management tasks can be applied to graphics files, Lotus 1-2-3 worksheets, and other word processor documents as well as to WordPerfect files.

For WordPerfect documents, you can use long, descriptive filenames in the File Manager and search on information contained in the document summary. Or you can invoke QuickFinder, which searches in seconds through even hundreds of megabytes of files to produce a list of those that contain the words you specify. It's a feature from WordPerfect for Windows that's better implemented in the DOS version. And 6.0 borrows another feature from WordPerfect for Windows—QuickList, a customizable list of frequently used directories and files, identified by lengthy descriptions. With the other features of the File Manager dialog box, WordPerfect makes finding and organizing files as easy as it can get under DOS.

Interactive Help from the Coach

WordPerfect 5.1 users shouldn't need more than a few sessions with the new version to get up to speed. Even those with no WordPerfect experience will probably find 6.0's menus and dialog boxes easy to learn and use. For more complex features, WordPerfect 6.0 supplements the documentation, online tutorials, and context-sensitive help with an innovative, interactive help system called Coaches.

Coaches move beyond canned examples and work with live text, so you can get real work done while you learn. You can follow a Coach's step-by-step instructions for a task or sit back and let the Coach show you how it's done.

Also, because the Coaches are written in Version 6.0's powerful new macro language, they can be developed to help train employees to perform customized procedures. It's not a job for the faint of heart—building Coaches demands a thorough understanding of how WordPerfect macros work. Large organizations that routinely create complex, standardized documents are most likely to develop the expertise to take full advantage of this feature.

The New Goodies

WordPerfect has always enjoyed a reputation for sheer power, and the new version adds muscle. For starters, take a look at outlines and styles—two areas where previous incarnations of WordPerfect have fallen short.

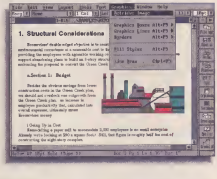
Earlier versions of WordPerfect included a simple-to-use outlining capability with automatic renumbering and indenting. With the new version, you can collapse any

THE THREE INTERFACES OF WORDPERFECT 6.0

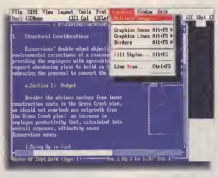
It looks like Windows—unless you want it to look like WordPerfect.

Compare WordPerfect 5.1's bare-bones interface with 6.0's multiple interfaces. The new Text, Graphics, and Page modes are all customizable, and together they provide a relatively easy transition from WordPerfect 5.1 traditions to Windows conventions.

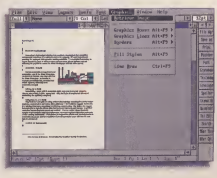
WordPerfect 5.1 improved on earlier versions by adding pull-down menus, but it indicated graphics only with line boxes.



6.0 GRAPHICS MODE
WordPerfect 6.0's Graphics mode does a pretty good impersonation of a Windows program.



6.0 TEXT MODE
The Text mode of WordPerfect 6.0 for DOS still doesn't show graphics, but it emulates the button bars, scroll bars, and other graphical elements with text characters.



6.0 PAGE MODE
The Page mode in 6.0 is identical to the Graphics mode, except that it also shows headers, footers, footnotes, and margins.

Introducing WordPerfect® Office 4.0.

Large or small, local or global, companies operate on meetings. Memos. Deadlines. And paperwork, paperwork, paperwork.

If you've ever had to make ten calls to get four people in the same room, or wait three days for a purchase order from the eighth floor, you know how well the system usually works.

But now there's a new system — a single, cross-platform workgroup application that can handle all your internal business operations and communications electronically. It's WordPerfect® Office™ 4.0, the first "operating system" for companies.

E-mail isn't enough anymore.

Organizations still driven by the telephone and the mail cart may see e-mail as the next step.

But WordPerfect Office advances the technology of e-mail by "mail enabling" not just messages, but all the basic, relentless stuff of business like meetings, appointments, tasks and paperwork. In effect, it automates the flow of work and information through (and throughout) your company.

WordPerfect Office is the first comprehensive calendaring, scheduling and task management program to be integrated with a best-of-breed e-mail engine. There's nothing else like it available today, and perhaps surprisingly, it's available for the cost of e-mail alone.

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WordPerfect Office lets you control how information reaches you, where it's filed, where it's routed after it leaves your desk. You can accept, reject, or even delegate meeting requests. You or your proxy can check for conflicts on any number of personal calendars across any number of networks — even across dissimiliar computer operating systems — with a single keystroke.

Incoming mail can be automatically sorted and forwarded to others when you're out of town, or you can handle it yourself from your laptop. And with the industry's only electronic Out Box, you can check the status of any message or project at a glance (as well as retract and rethink any unopened messages).

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WordPerfect InForms,™ an electronic forms package included with WordPerfect Office,* can take most of the work — and all of the paper — out of routine office paperwork. Now, you can sign off on timesheets, invoices and other forms electronically and instantly distribute them anywhere in your organization (including virtually any desktop or SQL database).

make configuring, monitoring and maintaining your system easier. And perhaps most importantly, support for full directory services to greatly simplify the sharing of names between systems.

A new standard in electronic messaging.

By integrating e-mail, calendaring, scheduling, task

The first new idea in business communications since e-mail.

THE FIRST CORPORATE OPERATING SYSTEM.

Simplified administration across platforms.

WordPerfect Office was developed for LANs of as few as five users and WANs of as many as 100,000. And as you'd expect from WordPerfect, it's a highly-capable cross-platform package, supporting communications on Windows, DOS, Macintosh, UNIX, OS/2 and VAX/VMS.

WordPerfect Office offers a long list of gateways.

Diagnostic and management services to

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WordPerfect®

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to anyone in your organization. The Filler program (available now for Windows, and soon for other platforms) then makes short work of filling in the blanks — and even signing your documents — electronically. ☞ WordPerfect InForms supports desktop databases such as dBase, Paradox, FoxPro and DataPerfect as well as SQL databases like Oracle and Sybase, and it can act as a powerful front-end to any of them. So WordPerfect InForms is not just the end of paperwork as you've known it. It's a better way of managing and sharing business information. ☞ For more information or a free demonstration disk, call WordPerfect at (800) 526-3012.

WordPerfect

WordPerfect
6.0

You've Never Seen a DOS Word Processor Do *This* Before

Whatever work you do on a PC will wind up on a piece of paper, right? Most DOS word processors send you to the printer to see what that paper will look like. WordPerfect 6.0 supplies the graphical tools you need to put dazzling documents on paper in one pass—even if those documents require more than just word processing. Need a spreadsheet? Need personalized letterhead envelopes? Need to fax a letter? No problem. Those unusual capabilities are all built into WordPerfect 6.0.

1 EMBED A SPREADSHEET

Any self-respecting word processor can import data from an electronic worksheet. WordPerfect 6.0 eliminates the middleman by building in a fully functioning spreadsheet. The Table feature doesn't have the graphing muscle of a 1-2-3 or an Excel, but it provides 98 spreadsheet functions, including powerful math formulas and floating cells that you can embed anywhere in a document.

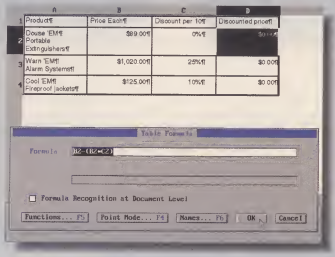
2 FAX DOCUMENTS

Next to a printer, a fax machine is the most likely destination for any document. WordPerfect 6.0 makes sending a document over a fax modem as simple as printing it. The fax feature lets you create multiple phone books from which you can send a fax to one or several numbers.

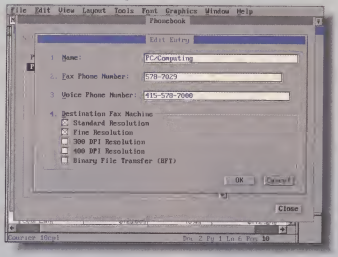
3 PRINT ENVELOPES

Theoretically, any DOS word processor can help you print envelopes—even adding postal bar codes as WordPerfect does. But this DOS word processor lets you add a logo to the return address, eliminating the need for custom envelope printing.

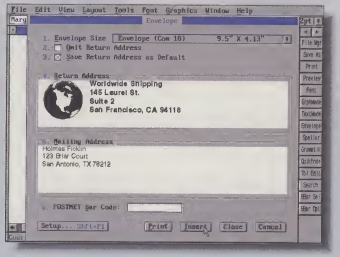
1. EMBED A SPREADSHEET



2. FAX DOCUMENTS



3. PRINT ENVELOPES



"It's a quality desktop replacement... most powerful portable we've seen. One of the lightest units in the entire test group."
– PC Magazine, Mar. '93

"...in our battery tests, the TI 4000 WinDX2/50 achieved a magnificent 6 hours and 24 minutes."
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PC MAGAZINE EDITORS' CHOICE
Mar. 30, '93

EXPERTS Windows CHOICE

PORTABLE COMPUTING
TOP PICK

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486 WinDX2/50	***486 WinDX2/40 COLOR***
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120 or 200MB HDD	*200MB HDD*
5.6 pounds	*6.3 pounds*

Battery life varies according to model and use.

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TEXAS INSTRUMENTS

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level of an outline to display only the top level of heading. To make the job easier, a customizable outline button bar allows you to modify the outline structure with a click of the mouse.

WordPerfect's styles are now more flexible and more powerful than Microsoft Word for Windows styles—but Word's are still far easier to use. With the new version, users can create styles for different types of documents and store them in a library. Styles from the library can be assigned to WordPerfect documents, or a document can be created with its own individual style. The libraries can be personal or shared over a network. And now styles can be linked, a feature similar to Word's Next Style but not nearly as easy to use. Essentially you link two paragraph styles together, alternating between them when you press Enter. For example, an article containing an interview could be easily set up with the question paragraph in one style and the answer paragraph in a second style.

WordPerfect's styles can be applied to any part of a paragraph—even a single character. And unlike with Word, if you make a change to a global style, old documents don't take on the new characteristics without your explicit permission. That's a big benefit to organizations that need to control the creation of complex, standardized documents.

Bells and Whistles

With old accounts like styles and outlining brought up to date, WordPerfect 6.0 moves on to new challenges. For example, about 80 percent of the functions of the defunct DOS spreadsheet PlanPerfect are now built into the table function.

You can still link WordPerfect documents to external 1-2-3, Excel, and Quattro Pro worksheets, but there's less need to when WordPerfect has a capable, integrated spreadsheet that can create documents such as an intelligent invoice or a time sheet that calculates time and billing.

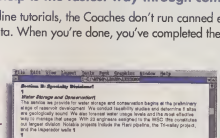
A particularly helpful feature is the concept of "floating cells," spreadsheet cells that can be included anywhere in a document. These cells originate from a table within the document or from a linked external spreadsheet. For example, the body text could include a sentence with infomation such as "Your total bill comes to $423.55," with the amount changing each time that the

INTERACTIVE COACHING

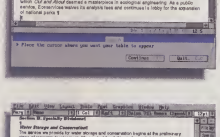
Step-by-step help is the fastest way through complex tasks.

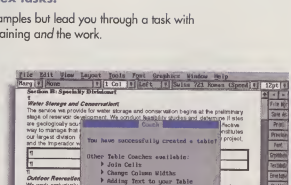
Unlike simple online tutorials, the Coaches don't run canned examples but lead you through a task with your own live data. When you're done, you've completed the training *and* the work.

1. ON YOUR MARK. WordPerfect 6.0's Cooches guide you through complex features, such as creating an outline, a mail merge, or, as in this example, creating a table.



2. GET SET. The Cooches direct you to make menu and dialog box selections that take effect in your live document.





3. YOU'RE DONE. Once you've finished a job, you can explore options within a feature without leaving the coaching environment.

figures in the parent spreadsheet changed.

Version 6.0 goes beyond traditional word processing by incorporating fax and e-mail links. After setting up the two memory-resident programs that communicate with the fax modem, you simply select Print/Fax from the File menu, and choose a name from the address list. WordPerfect supports Class 1 and Class 2 modems—the vast majority—and CAS-compliant fax devices, such as Intel fax modems. You can also attach a document written in WordPerfect to an e-mail message, using either WordPerfect Office's mail program or any DOS e-mail package that complies with the VIM and MAPI standards.

A new hypertext feature creates links among words in a single document or in multiple documents. You can even create a graphical push-button in a document, label it, and link it to a macro—clicking the button runs the macro. The hypertext feature is great for creating cross-references or for editing large documents for consistency. Or you can use the hypertext feature along with WordPerfect's new sound capabilities to develop interactive multimedia documents, including embedded audio clips.

Version 6.0 slathers on tools to help improve writing. It incorporates Grammatik V, the best-selling grammar checker. The spell-checker has been enhanced so that it can use multiple dictionaries during a single pass through a document—an important improvement for those who need specialized dictionaries for law or medicine. And the document-compare feature identifies differences between two versions of a document on four levels: paragraph, phrase, sentence, and word by word.

Improved Old Standards

WordPerfect macro and mail-merge abilities have always been among the best of any DOS program. In 6.0 they just get better.

The macro language now has 98 programming commands, compared to 38 in 5.1. With new commands for creating custom dialog boxes, it closely resembles a real programming language, and you can create or edit macros as you would any other document rather than using the awkward macro editor provided in 5.1. In essence, it combines the ease of keystroke recording with the power of a programming language.

You can still record keystroke macros, and then edit them to include conditional branching and variables that

Less than Perfect Support?

WordPerfect wrestles with new support plans.

Woy back when a naw-defunct company was the world's third-largest PC software provider, its CEO tried ta canvince users thot they should be paying for technical support. Trouble was, WordPerfect wos odding toll-free phone lines faster thon US West could lay cable. Today thot CEO hos less strenuaus duties, and WordPerfect has become the warld's third-largest PC software company. Along the woy, it set a standard for custamer support that nat all campetitars appreciate.

WordPerfect's custamer list naw exceeds 13 millian. Twenty thausond support questians pour in every doy. At the same time, the steep revenue grawth thot funded WordPerfect's oggressive support afferings has flattened just as a savage price war is squeezing profits.

Lotus's Ami Pra creator Said Mohammadiaun predicts that the doys af tatally free, tall-free suppart ore numbered at WardPerfect. According to Mahammadiaun, whase Ami Pro support lines are not toll free, "Suppart wos their form of marketing. But I think that chicken has came home ta roost."

If so, WardPerfect is fortunote ta hove Kim Cooper, who opproaches his jab as vice president af customer service with the intensity of a mother hen. "We still consider support to be the life blood of our business," he osserts. WardPerfect is guarding its brood by trying to reward onsite experts who support their fellow users. Cooper wauldn't confirm rumars that WordPerfect plans to crock dawn an freeloaders ar place limits on the free support period.

According to Bill Higgs, vice president af saftwore research at InfoCorp, the whole industry is trying ta limit support costs. That's bod news for users wha rely heavily on suppart, and could be bod news for WardPerfect, whase loyal customers might be more easily wooed by Windaws competitors during the switch from DOS if suppart policies change dramatically. **Mike Hogan**

WordPerfect Fast Facts

- **WordPerfect answered 4.9 million calls in 1992.**
- **They average 19,377 calls a day.**
- **Each day, they resolve all but 200 questions on the first try.**
- **The average wait is 41 seconds.**
- **The average call lasts 8 minutes, 35 seconds.**
- **40,000 regular participants ask 12,000 questions a day on WordPerfect's free BBS.**

don't lend themselves to recording. The new macro language is a big boost to independent and in-house developers who need to create custom procedures for complex document creation.

WordPerfect 6.0 supplies a program to convert 5.1 macros to 6.0. It's not perfect, but it works better than the program that comes with WordPerfect for Windows.

Mail merge continues to work with the new macro language. In addition, the contents of tables can be used in merge operations, although you can still use 5.1-style merge documents. Conditional merges have been improved so that you can churn out letters to, for example, people named Smith and living in zip code 94118. A merge operation can now also automatically produce a merge printing file for addressing envelopes. Despite the additional muscle and improvements over 5.1, the mail-merge program is still far harder to use than many other mail-merge programs (see page 148).

Enhanced Layout and Graphics

WordPerfect for Windows is an awkward tool for composing complicated pages. WordPerfect 6.0 for DOS tackles this problem by adding powerful new layout and graphics tools.

Physical pages can be subdivided into multiple logical pages, and each logical page can then be formatted separately. For example, one page can be divided into four quarter pages, each of which can have a header and a page number. This feature is especially useful for producing booklet-sized landscape printouts or brochures.

Although WordPerfect 6.0 doesn't include a drawing package like those in Ami Pro or Word for Windows, its handling of graphics is much improved. You just double-click on the graphic or any other box to display the graphics editor, where you can change the brightness and contrast of an image, invert it, flop it, or rotate it. Some delicious new touches include wrapping text along the irregular contours of an illustration and dragging and dropping graphics.

Version 6.0 makes a serious art of border styles. You can choose from a variety of lines, borders, shadows, and corners or create your own permanent collection. The borders can be added to graphics, paragraphs, or pages. You can select prefabricated boxes such as a Windows-style push-button box from a menu or customize your own. Any box can include a variety of fill patterns, including gradient shading.

Printing now includes color graphics and automatic watermarks—shaded text such as "COPY" that overprints the main text of a document, a feature that used to require futzing with text boxes. Column printing has been enhanced with automatic rules in gutters, support for ending columns at the same vertical position, and support for including footnotes in columns.

Little Things Mean a Lot

Those are the big improvements. But some of the most pleasing improvements are little things—like envelope addressing. When you activate the menu option for envelopes, Version 6.0 automatically finds the salutation in a letter and places it in a dialog box, along with an optional return address that you've stored there. You can select various envelope sizes and customize print settings. WordPerfect will also convert a 9- or 11-digit zip code into a PostNet bar code and print it on the envelope.

And for the many diehard WordPerfect users who swear by code-based formatting, WordPerfect retains its Reveal Codes feature, even adding a new code for inserting the path and/or filename of a document.

If any one application can single-handedly keep DOS alive, this is it. Loyal WordPerfect users won't just use it; they'll love it. But the number one question remains: Can WordPerfect balance its power with usability? We brought WordPerfect 6.0 into *PC/Computing*'s Usability Labs alongside the three leading Windows word processors to find out.

Should I Upgrade?

Yes, if

- You want a graphical environment *and* you want to continue working in DOS.
- Your office PCs can't run Windows efficiently.
- You're working at the limits of WordPerfect 5.1's page-layout and desktop-publishing tools.
- You routinely perform complex mail merges.
- You need a powerful macro language that will automate complex tasks.
- You need fax, sound, or e-mail capabilities integrated with your word processor.
- Your organization produces large, complex documents.
- You frequently train new personnel to perform word processing.
- You need scalable fonts and other graphics printing in a DOS environment.

No, if

- You have no investment in earlier versions of WordPerfect.
- You want to work entirely within pure Windows applications.
- You need an integrated drawing package.
- You can't justify the cost for a significant number of users in your organization.

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❷ Best Database:
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1992 BYTE READERS' CHOICE AWARD
WordPerfect for Windows 5.2
June, 1992

PC MAGAZINE EDITORS' CHOICE
Paradox for Windows
May 11, 1993

INFOWORLD 1992 PRODUCT OF THE YEAR AWARD
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War of the Words

Is it time to change your word processor?

There are certain topics you don't bring up in polite company. Sex. Politics. Religion. Word processors.

Try this: Walk into the next office and tell your best friend he has to switch word processors. Watch his teeth clench, his eyes narrow to slits, and that purple vein in his forehead begin to throb. You'd have better luck convincing Rush Limbaugh to shave his head and sell flowers at O'Hare.

Why do word processors inspire this kind of fanatic loyalty?

Maybe it's because, for most of us, the word processor is the first application we fire up in the morning and the last one we see before leaving the office. We use word processors for everything from cover-your-rear memos to 10,000-piece mail merges to 400-page proposals that can make or break million-dollar deals. On average, we spend more time working with our word processors than with any other application—and eventually it becomes not just software but an extension of ourselves.

It takes a momentous event to convince people to even *consider* switching word processors. The release of WordPerfect 6.0 for DOS is that kind of milestone. Finally, there's a graphical alternative for the 13 million registered WordPerfect 5.1 users who haven't been swayed by the current crop of Windows word processors. And it's an ideal opportunity for anyone who's already converted to Word for Windows, Ami Pro, or WordPerfect for Windows to consider the options.

We brought the new WordPerfect and three leading Windows word processors into *PC/Computing*'s Usability Lab for a full-fledged face-off. The results will surprise you.

BY KYLA K. CARLSON

PHOTOGRAPHS BY ROBIN GINGERICH

DECIDING FACTORS

What to look for when you buy

Usability 30%
All four products faced our usability testers—real people who performed real-world tasks.

Document Creation and Editing .. 25%
How a word processor handles everyday documents can make your work painless or pure torture.

Formatting and Layout 10%
Routinely producing complex documents with columns, tables, and graphics requires powerful but accessible tools.

Integration 10%
As a primary business communications tool, your word processor has to integrate data from the entire desktop.

Performance 10%
Sometimes it's just annoying; sometimes it'll drive you to distraction. Performance means how long you wait before you get back to work.

Customizability 5%
Change the program to match how you and your company do business.

Documentation and Support 5%
You bought it—now what?

Mail Merge 5%
Automating mailings saves time, unless a slew of bewildering options bogs you down.

Microsoft Word for Windows Version 2.0C
A top-notch Windows word processor that goes the distance in simplifying everyday tasks. $495.

Microsoft Corp. • 1 Microsoft Way, Redmond, WA 98052 • (800) 426-9400, (206) 882-8080

WordPerfect for Windows Version 5.2
The classic DOS word processor moves to Windows—and brings lots of WordPerfect users with it. $495.

WordPerfect Corp. • 1555 N. Technology Way, Orem, UT 84057-2399 • (800) 321-4566, (801) 225-5000

WordPerfect 6.0 for DOS
The newest version gives you o grophicol user interface with good ol' DOS. $129 upgrode, $495 new user.

WordPerfect Corp. • 1555 N. Technology Way, Orem, UT 84057-2399 • (800) 321-4566, (801) 225-5000

Ami Pro for Windows Release 3.0
The best word processor for producing highly formotted complex documents. $495.

Lotus Development Corp. • Word Processing Division, 5600 Glenridge Dr., Atlanta, GA 30342-1334 • (800) 831-9679

HOW WE TESTED

What makes a winning word processor?

If all you ever write is memos, even EDLIN will do. But if your documents are designed to close soles, persuade investors, or win promotions—only a real word processor can do. For each deciding factor, we examined essential business features. We didn't just determine if the features exist or if they work. We took a hard look at how quickly and effectively they let you accomplish real work. Then we put our opinions and research to the test. *PC/Computing*'s technical staff measured how quickly the products complete common tasks. And the *PC/Computing* Usability Lab developed and monitored a series of tests with real users. Finally, we assigned a weighting for each factor that reflects its importance to business users.

Usability 30%

Our usability testers were familiar with typical word processors such as Ami Pro, Microsoft Word, WordPerfect for DOS and Windows, and Word for Windows. Users ran scripted tests designed to evaluate a product's ability to complete real-world tasks, including creating and printing a merge-print document, incorporating graphics, and importing spreadsheet data.

Document Creation/Editing 25%

We evaluated style sheets, search-and-replace tools, and bulleted and numbered lists for accessibility and ease of use—the essentials for creating business letters, memos, and reports. We also checked out how easily you can create and modify tables. And we looked at writing tools, such as spell-checkers, thesauruses, and grammar checkers.

Formatting/Layout 10%

Producing complex documents requires powerful and usable tools, including features for formatting basic elements—such as text and paragraph attributes—as well as more sophisticated features like column support. We also examined graphics editing capabilities, including tools for creating and resizing boxes or frames and for wrapping text around illustrations.

Integration 10%

Productivity requires that your word processor fit into the total computing environment. We examined how easily the word processors link to other applications and how well they support formats for importing and exporting data from and to other applications. We also considered how well the products integrate with PC products, such as e-mail, fax software, and even sound boards.

Performance 10%

Our tests were designed to determine how fast the word processor performs everyday tasks, such as opening and saving files, scrolling to the bottom of a screen, and searching and replacing text. We analyzed printing performance by testing how quickly the products printed 4-page and 10-page documents, and how long you have to wait for merge printing.

Customizability 5%

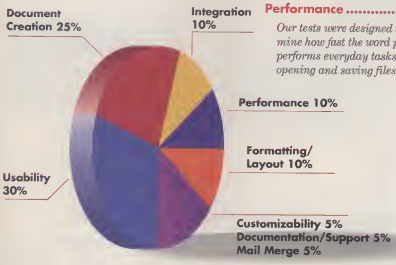
Individual preferences and corporate needs make customization a key issue. We considered how easily you can create icons and modify toolbars and menus. We also considered the macro capabilities, focusing on the predefined macros that ship with the product, and the power and usability of the macro language.

Documentation/Support ...5%

We evaluated the documentation for each product, noting overall organization and usefulness. We also reviewed the availability of technical support via telephone and bulletin boards. Finally, we placed anonymous calls to gauge how easy it is to reach a technician and to judge the quality of support.

Mail Merge 5%

We judged how well the tools support mail merge. We also tested how easy (or difficult) it is to create the required files and how much assistance the program gave the user in producing a merged document. We also evaluated features for creating and printing envelopes—a critical feature for mass mailings.



PC/COMPUTING DECISION MAKER

Which word processor is right for *your* business needs?

1. Choose the document type you most frequently create.	2. Choose the most important factor.	3. What else is important?	4. For your needs, the best product to buy is . . .
Text document	Document creation/editing	WordPerfect compatibility	WordPerfect 6.0 for DOS
		Performance	Word for Windows 2.0C
	Formatting/layout	Customization	Lotus Ami Pro 3.0
		Support	Lotus Ami Pro 3.0
Complex documents with graphics/data	Formatting/layout	Customization	Lotus Ami Pro 3.0
		Support	Lotus Ami Pro 3.0
	Integration	Performance	Lotus Ami Pro 3.0
		Support	Lotus Ami Pro 3.0
Technical documentation/automated documents	Document management	WordPerfect compatibility	WordPerfect 6.0 for DOS
		Integration	WordPerfect 5.2 for Windows
	Customizability	WordPerfect compatibility	WordPerfect 6.0 for DOS
		Performance	Lotus Ami Pro 3.0

LOTUS AMI PRO 3.0

There's no job Ami Pro can't handle.

PC Computing BEST

Right out of the box, Ami Pro offers a superb blend of power and usability. It finished a close second in our overall usability tests, which emphasize everyday editing. But it's the hands-down winner when it comes to complex documents that communicate with more than mere words—in other words, the kind of documents that define successful business processing needs. Backed by strong support, Ami Pro satisfies a full range of word processing needs, making it the clear winner.

How Do You Explain the Power of a Creative Idea?

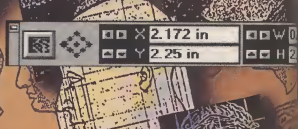
You don't. You show it.

And the best way to show it is with Aldus® PageMaker® 5.0 for Windows. With more than 100 new or enhanced features, this new version of PageMaker makes it easy to produce your creative ideas *exactly* as you envision them.

Right away, you'll find we've added to the power of PageMaker. You'll be able to import text and objects from more applications and, as always, seamlessly share PageMaker files between Windows and the Macintosh.

Add in PageMaker 5.0's unparalleled versatility. Its breathtaking advances in precision and control. Its intuitive interface. Plus Aldus' award-winning technical support. No wonder PageMaker is the world's leading professional publishing software.

So take a look at the new and improved PageMaker. It's a powerful idea whose time has come.

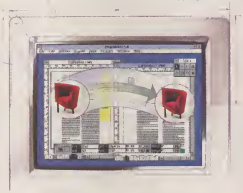


ALDUS PAGEMAKER 5.0— THE NEW FACE OF CREATIVITY.

NEW: Incremental rotation of text and graphics.
It's easy to rotate in 0.01-degree increments—either visually, using the rotation tool or numerically, using the Control palette (where you can also skew and mirror elements). You can even edit text directly once it's been rotated.

NEW: Multiple open publications.
Now you can work with unlimited publications open at the same time. Plus move elements among them simply by selecting an object in one publication, dragging it to another, and dropping it in.

NEW: More import filters than ever.
It's a snap to integrate text, illustrations, and images in many new formats, including Kodak Photo CD, WPG, DXF and PICT-to-Metafile conversion. PageMaker 5.0 provides more than 65 import/export filters in all.



NEW: Control palette.
Easily and precisely place objects and apply text attributes from the new Control palette. This powerful tool lets you handle much of your work without ever pulling down a menu.

THE NEW PAGEMAKER 5.0 FOR WINDOWS WILL SPEAK VOLUMES ABOUT YOUR WORK.

To understand fully how much more intuitive, responsive, and precise the new PageMaker really is, give us a call. We'll send you a 12-page brochure illustrating the many amazing things PageMaker 5.0 for Windows can do. Both for you *and* your creativity.

CALL (800) 685-3519 FOR MORE INFORMATION.

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Other Key Features

- Pasteboard layout metaphor
- Story editor, an integrated word processor with spelling checker, search/replace
- Font sizes from 4 to 650 points in 0.1-point increments
- Table of contents, index, and book capabilities
- Publications from 1 to 999 pages
- Built-in color separation
- Extensibility through Aldus Additions
- Table Editor with a hotlink from PageMaker
- Irregular text wrap around all sides of an object
- Extensive typographic controls, such as leading, kerning, tracking, letter spacing, text width
- Font mapping for cross-platform font substitution
- OLE support (as a client application)
- And much more

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Usability 30%

What good's a word processor that's packed with features you can't find? Here's the real question: How quickly and effectively can you get work done?

It's a close call, but Microsoft Word is the most usable word processor in the bunch. Don't just take our word for it. Listen to what one usability tester had to say: "You can get up to speed on WinWord fairly quickly, put it down for a few weeks, then pick it up again and get back to work in no time. But, you must regularly and faithfully use a product like WordPerfect to appreciate its power."

Ami Pro takes the No. 2 spot: Users found it easy to create and manipulate complex documents using Ami Pro frames and reported it the easiest for manipulating graphics. And when it came to importing spreadsheet data into documents, our testers voted Ami Pro tops.

Don't be fooled—all of these programs received high usability scores. In the two most important usability categories—document creation and editing, and formatting and layout—all products scored high. We attribute this to the toolbars and graphical environments (we tested WordPerfect 6.0 for DOS in its graphical mode), which eliminates the guesswork in getting the right look for your document.

WordPerfect 5.2 is the least user-friendly of the Windows packages. To the uninitiated, the menus will be intimidating. And while WordPerfect 6.0 tries to address some of WordPerfect for Windows' usability shortcomings, our users still stumbled around in the new version. Since usability is partly determined by what you already know, here's a potential sore spot for faithful WordPerfect users: WordPerfect 6.0's menu structures deviate from earlier versions.

One usability tester observed that WordPerfect hasn't taken full advantage of Windows. If you're a diehard WordPerfect user, you won't find this too troubling. But if you're picking up a Windows word processor from scratch, WordPerfect is not the place to start.

In word processing, at least, familiarity breeds contentment: The easiest thing you can do is stick with what you use. As one tester noted, "unless a new product offers an order of magnitude of improvement, ease of use, or features that you were lacking, you're going to be biased toward the one you know."

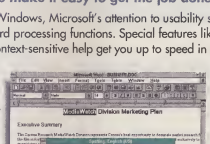
	Verdict
Microsoft Word for Windows 2.0C	9.2
Lotus Ami Pro 3.0	8.4
WordPerfect 5.2 for Windows	8.1
WordPerfect 6.0 for DOS	7.0

WORD ACES THE USABILITY TEST

The right tools make it easy to get the job done.

With Word for Windows, Microsoft's attention to usability shows in basic and complex word processing functions. Special features like predefined templates and context-sensitive help get you up to speed in no time flat.

When you use Word's spell-checker, you can always see the word in question within the context of the document.



1. Word takes care of the details for you with predefined templates for reports, memos, and other documents. Just select File, New and attach a template.

Word's envelope feature recognizes the first address on the left side of the page as the address to send the letter to. It can also store your return address for future use.

2. Word makes sure that you don't get lost in the new document. By clicking on an Instructions button, you get a mini help screen that tells you what to expect.

PCComputing USABILITY APPROVED

Introducing the World's First Usability Seal of Approval

Don't you wish you could buy with absolute confidence? Now you can.

Everyone wants power. But what good is oll thot power if you con't fully horness it?

In the real world, here's whot's important: An interface that onticipates your needs. Hassle-free installation. Instant occess to the feature you wont. Help thot practically reads your mind.

There's only one way to measure these key differences between products—with rigorous scientific testing in o state-of-the-ort usobility lab. With real users on one side of the glass ond expert usobility testers on the other.

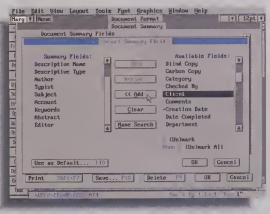
PC/Computing pioneered usobility testing as o woy to help you buy PC products with absolute confidence. We're the only mogozine that does it.

Look for the *PC/Computing* Usability Seal. It's your assurance that you're buying the best.

PCComputing USABILITY APPROVED

AMI PRO 3.0

Lotus focused on making the hord jobs easy. No one can touch its stellor formotting ond seomless integrotion.



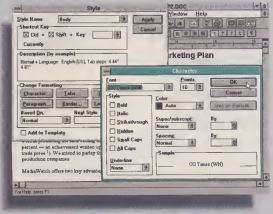
WORDPERFECT 6.0

It jumps through hoops like no DOS product we've ever seen. But it suffers from the usability limitotions inherent in every DOS progrom. Close, but no cigor.

PCComputing USABILITY APPROVED

WORDPERFECT 5.2

WordPerfect 5.2 for Windows has opproached usobility with religious fervor. The compony's commitment to usobility testing hos poid off in this version.



PCComputing USABILITY APPROVED

MICROSOFT WORD 2.0C

Microsoft freely admits that it zeroed in on o hondful of usability targets. It shows. While fro from perfect, Word for Windows 2.0C is omong the best.

Document Creation and Editing 25%

The everyday stuff—memos, letters, reports, and lists—should be no sweat. If your word processor can't deliver, neither can you.

At the wire, it's Word for Windows by a whisker over Ami Pro for document creation and editing. Word's basic tools are well implemented and accessible, but what gives it that finishing kick is a straightforward focus on usability. In particular, its well-organized menus offer access to tremendous power without overwhelming you.

The fact that Ami Pro is based heavily on styles is both its blessing and its curse. You might find it confusing to rely on styles for most formatting tasks, but the styles are accessible from the bottom of the screen, and Ami Pro ships with more than 50 predefined style sheets to help you get started.

All four products handle tables with grace: You can create tables from icons on the toolbars and determine the number of rows and columns before entering any data. In Word and Ami Pro, you add rows or columns through the table menu and resize table cells by clicking and dragging the cell borders or by entering numerical values. But table options are not so obvious in either WordPerfect product. And while every contender lets you add, subtract, multiply, and divide in tables, only WordPerfect 6.0 for DOS has a built-in spreadsheet, providing a rich assortment of powerful math functions.

As for search-and-replace options, one product sticks out—like a sore thumb: WordPerfect for Windows won't allow the first letter of the search word to be used as the wildcard. So, you have to run two searches if you wish to find *affect* and *effect*. To remind yourself of the difference an *e* can make, turn to the grammar checker each product includes. In all four, you can define your own rules, specify the type of document (legal or medical, for example), and collect various statistics on documents.

If you create lots of numbered lists, consider Ami Pro. While Microsoft Word offers a macro on the toolbar for numbered lists, it doesn't go the distance like Ami Pro, which updates your numbers every time you add, delete, or rearrange items on a list.

If you want to jump into basic word processing, Word is the one for you. Its interface is intuitive and the default toolbar gives you one-click access to everyday functions.

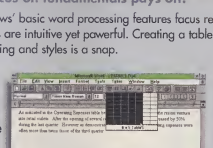
	Verdict
Microsoft Word for Windows 2.0C	**10.0**
Lotus Ami Pro 3.0	9.8
WordPerfect 6.0 for DOS	7.5
WordPerfect 5.2 for Windows	7.0

EASY DOES IT

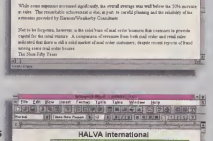
Microsoft's focus on fundamentals pays off.

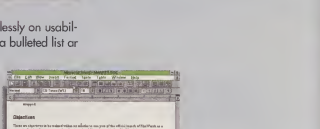
Word for Windows' basic word processing features focus relentlessly on usability. Menu choices are intuitive yet powerful. Creating a table or a bulleted list or changing formatting and styles is a snap.

You can insert a table between paragraphs by pulling down an expandable grid from the toolbar. To resize the cells, just click and drag to the size you want.

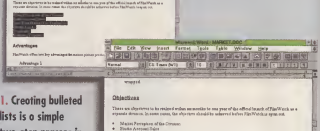


Anyone can search for a word or phrase. With Word's powerful, usable search-and-replace function, you can also search for text, formatting, and styles.





1. Creating bulleted lists is a simple two-step process in Word for Windows. First select the text you want to appear in a bulleted list.



2. Next, click on the bullet icon on the toolbar, and voilà, you have a bulleted list. To change the format of the bullets, use the Bullets and Numbering selection under the Tools menu.

WHY SETTLE FOR A DOT MATRIX PRINTER WHEN YOU CAN HAVE ALL THIS?

For about the same price as a dot matrix printer, the new TI microMarc gives you the same 300 dpi print resolution as most laser printers. And with its advanced inkjet technology, print quality stays constant for the life of the print cartridge, instead of fading like a dot matrix ribbon. The microMarc is so quiet, reliable, inexpensive to run and easy to use, it can help you do more with your printer than you ever thought possible. At a price you never thought possible. For more information and the dealer nearest you, call *1-800-527-3500*.

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TEXAS INSTRUMENTS

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*Estimated U.S. dealer selling price. Dealer prices will vary. "Extending Your Reach With Innovation" and microMarc are trademarks of Texas Instruments. © 1993 TI.

Formatting and Layout.....10%

For information that can't be be captured with words alone, you need an image maker on your side—a word processor with design smarts.

No doubt about it: If your documents are stuffed with charts, graphs, and pictures, Ami Pro is the word processor for you. Ami Pro's frames and styles offer incredible power and ease of use for churning out good-looking, highly formatted documents packed with information. Styles are always accessible on the status bar at the bottom of your screen. And for modifying styles, the style dialog box is just a right-mouse-click away. Ami Pro's powerful frames contain graphics, text, and even other frames. In addition, Ami Pro is the only program to offer more than one level of undo. You can undo up to four levels, which makes experimentation less risky.

That's not to say, however, that other word processors don't offer extensive layout capabilities. WordPerfect 6.0 executes a few maneuvers that would rate 9.9's in the corporate-image Olympics. For instance, it not only wraps text around all sides of a graphical box, it also wraps text around an irregularly shaped illustration. And it's a snap to create and edit captions for your graphical boxes. Both versions of WordPerfect offer superior column capability with easy access from menus or toolbars.

Basic text formatting is a breeze with any of these programs. With mouse support and customizable toolbars, the formatting attributes are only a click away. If you rely on styles for complex text formatting, stick to Word for Windows or Ami Pro. Both versions of WordPerfect offer superb style support, but you pay the high price of complexity for all that power.

WordPerfect 6.0 for DOS supports several types of scalable fonts, including TrueType and Intellifont. This keeps it on a par with the Windows packages, which all support TrueType fonts, thanks to Windows 3.1. And while all the programs we tested have simple tools for graphics manipulation, if you want industrial-strength graphics-editing tools, select either WordPerfect version.

Both versions of WordPerfect pack a lot of power, but they lack the ease of use that you'll find in Ami Pro. Because its powerful features are so accessible, Ami Pro is the best choice for working with complex documents.

		Verdict
✓	**Lotus Ami Pro 3.0**	**9.5**
	WordPerfect 6.0 for DOS	8.5
	WordPerfect 5.2 for Windows	8.0
	Microsoft Word for Windows 2.0C	7.5

FORMATTING MUSCLE, LAYOUT GRACE

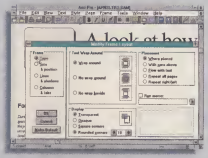
Ami Pro has the power and flexibility for picture-perfect documents.

Ami Pro's frames and styles incorporate all the tools needed to create highly formatted documents that contain graphics. You can insert boxes, resize them, and add borders and shadows—all with point-and-click ease.

Ami Pro contains familiar desktop publishing features. Choosing Create Frame inserts a box in your document. To resize the frame, click on it and drag on any of the paints.

Double-clicking on a graphic selects it, which allows you to move or resize it within the frame. In addition, a special set of drawing tool icons appears beneath the toolbar.

Besides manipulating text flow, you can add borders and shadows to the frame and arrange the layout of text within the frame—all from the Modify Frame Layout menu.



Style Management in Ami Pro allows you to attach new styles to your document and assign keystrokes to them for easy access.

FEATURES FRENZY

If you can't do it with one of these word processors, it can't be done.

● = Yes ○ = No

	Lotus Ami Pro 3.0	Microsoft Word For Windows 2.0C	WordPerfect 5.2 For Windows	WordPerfect 6.0 For DOS
STYLE/FORMATTING TOOLS				
Alternating paragraph styles	●	●	○	●
Character-based styles	○	○	●	●
Irregular text wrap	○	○	○	●
Number of predefined document templates	57	19	44	4
EDITING TOOLS				
Levels of undo	4	1	1	1
Levels of undelete	4	1	3	3
Document comparisons	●	●	●	●
Redlining or revision marks	●	●	●	●
Strike-through	●	●	●	●
Equation editor	●	●	●	●
TABLE AND GRAPHICS TOOLS				
Number of spreadsheet functions	39	36	8	98
Basic drawing tools (lines and boxes)	●	●	●	●
Image-manipulation tools	●	○	●	●
Charting tools	●	●	○	○
Number of clip-art images	100	46	36	30
FILE MANAGEMENT				
Preview files from a list	●	●	●	●
Delete files	●	●	●	●
Rename and move files	●	○	●	●
Create directories	○	○	●	●
Print files from a list	●	●	○	●
HELP SYSTEMS				
Context-sensitive help	●	●	●	●
Interactive help	○	○	○	●
Online tutorial	●	●	○	●
DISK REQUIREMENTS				
Minimum install (MB)	4.5	2.7	4	6
Full install (MB)	13	15	15	15

Integration 10%

No matter where your data comes from—the keyboard, a database, a spreadsheet—your word processor should help you tie it all together with ease.

Right out of the box, Ami Pro talks to the rest of your desktop. WordPerfect 6.0 for DOS, on the other hand, is essentially an isolationist: The program is still a victim of its operating system. Integration with other applications and documents is paramount, and though WordPerfect 6.0 offers some of these capabilities, DOS just won't let it go the full distance.

All of the Windows applications support object linking and embedding as a client, and Word and Ami Pro can function as OLE servers as well, which means you can embed spreadsheets or graphics files in your documents and gain easy access to editing capabilities. Just double-click on an Excel chart, and you'll be launched into Excel to perform live editing. And if you create live links to your documents, you'll always be working with the latest data. While WordPerfect 6.0 doesn't let you embed information in your document, you can create links to other DOS documents.

Most e-mail messages are text documents, and most e-mail packages include terrible editors. So why not send e-mail from your word processor? Ami Pro offers just this capability. If you run cc:Mail or Lotus Notes, Ami Pro inserts a Send Mail command in your File menu. When you receive mail, an envelope appears, accompanied by a little beep, at the bottom status bar. Click on the envelope, and you're inside your e-mail package. WordPerfect for Windows offers support for VIM and MAPI e-mail formats. You'll need to modify your WPC-.INI file to achieve similar results.

The most important element of integration is the type of formats supported by your word processor. Passing information between it and other word processors, spreadsheets, databases, and graphics packages is essential. Each of the four programs offers an impressive list of formats.

WordPerfect 6.0 does have one unique advantage: It's the only one to offer automated fax support. If you've got a fax modem, you're on your way. WordPerfect supports Class I, Class II, and CAS fax modems, so you can send faxes from within the program. With that single exception, Ami Pro is unbeatable for overall integration.

	Verdict
✓ **Lotus Ami Pro 3.0**	**10.0**
WordPerfect 5.2 for Windows	8.5
Microsoft Word for Windows 2.0C	8.0
WordPerfect 6.0 for DOS	6.5

WORDPERFECT 6.0: LIKE WINDOWS, SORT OF

Because WordPerfect is a DOS application, you have limited options when you need to work outside the capabilities of the word processor. In contrast, the Windows environment offers a rich assortment of tools for integrating applications.

THE WORDPERFECT WAY

To launch a third-party program or utility you must either exit WordPerfect or use the launcher facility to swap the main program into RAM or onto the disk, and then start the second program.

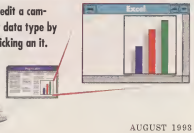
THE WINDOWS WAY

Windows offers three ways to work with multiple data types simultaneously.

1. Task switching allows you to switch between programs.

2. DDE lets you maintain live updates between an external data file and something embedded in the document.

3. OLE lets you edit a completely different data type by simply double clicking on it.



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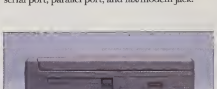

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Performance 10%

Two seconds here, twenty seconds there—it all adds up. Fortunately, all word processors are not alike—one in particular is a lot faster than the others.

Who's the Carl Lewis of word processors? Every time we clicked the stopwatch, there was Ami Pro. It scrolled and jumped three times faster than the others. We tested printing, and Ami Pro topped them all, requiring just under three seconds to start a merge print and let us get back to work. Only in file manipulation—opening and saving files—did Ami Pro lose out to Word for Windows. But overall, our performance tests rate Ami Pro as the speediest package in the bunch.

WordPerfect 6.0 for DOS, tested in its graphic mode for a close comparison to Windows products, posted the second-fastest times overall. WordPerfect 6.0's printing of 4- and 10-page documents were on par with Ami Pro's and significantly faster than Word and WordPerfect for Windows. Its print-merge times for a 30-record file were especially slow, however, taking more than 2 minutes to do what Ami Pro did in a few seconds. WordPerfect has only one formatter for displaying and printing, so you have to wait until the print job is finished before you can get back to work. In contrast, Ami Pro contains a re-entrant print-merge formatter that essentially spins printing off as a background task.

Word for Windows took the third spot in our speed tests. No wonder—Word constantly redraws the screen as you scroll through a document. Word also prints much more slowly than Ami Pro. However, Word jumps to locations within a document and performs search-and-replace operations quickly enough—about as fast as Ami Pro and WordPerfect 6.0.

Who's the slowest of them all? WordPerfect for Windows. It scrolled three times more slowly than Ami Pro, though much faster than Word. It searched and replaced at half the speed of WordPerfect 6.0 and about ten times slower than Ami Pro. Finally, although WordPerfect for Windows' print-merge times were the second fastest in the group, they were still much slower than Ami Pro's.

Ami Pro posted such quick times, especially in the print-merge portion of our tests, because Lotus has optimized Ami's code with each upgrade. If you want to get home for the six o'clock news, Ami Pro is your pick.

	Verdict
✓ **Lotus Ami Pro 3.0**	**9.5**
WordPerfect 6.0 for DOS	7.5
Microsoft Word for Windows 2.0C	6.2
WordPerfect 5.2 for Windows	5.2

AMI PRO SPRINTS TO THE TOP

Who says a Windows word processor has to be slow?

We tested all four products and measured them against a baseline average. In all instances, WordPerfect 6.0 was tested in its Graphics mode.

- **Ami Pro merge-prints lightning fast because it contains a re-entrant merge-print formatter that spins off printing as a background task.**
- **WordPerfect 6.0 for DOS prints regular documents nearly as quickly as Ami Pro, but it can't compete with Ami Pro's optimized code for merge printing.**
- **Word for Windows constantly redraws the screen as you scroll through a document—slowing it (and you) down.**
- **WordPerfect for Windows ran last in every performance category.**

Printing	
Lotus Ami Pro 3.0	50% Faster
WordPerfect 6.0 (DOS)	16% Faster
Word 2.0C (Windows)	31% Slower
WordPerfect 5.2 (Windows)	35% Slower
Average Speed	Baseline

Text Manipulation	
Lotus Ami Pro 3.0	47% Faster
WordPerfect 6.0 (DOS)	7% Faster
Word 2.0C (Windows)	16% Slower
WordPerfect 5.2 (Windows)	37% Slower
Average Speed	Baseline

File Manipulation	
Word 2.0C (Windows)	10% Faster
Lotus Ami Pro 3.0	1% Faster
WordPerfect 6.0 (DOS)	4% Slower
WordPerfect 5.2 (Windows)	6% Slower
Average Speed	Baseline

Customizability 5%

If the features you use every day are buried six menu layers deep, why not give them top-level attention? You can by changing the interface.

You don't look good in off-the-rack suits—don't settle for an off-the-rack word processor. The best word processors let you adapt menus and tools to suit your individual work style and even build complete new interfaces to meet corporate needs. Ami Pro delivers the best support for customizing a word processor.

The most obvious way to customize is through the toolbar—and Ami Pro's SmartIcons are a great place to start. Ami Pro ships with 151 predefined icons, grouped in 8 sets. You can position them at the top, bottom, left, or right side of your document or as a floating palette. If you can't find the icon you want, build your own using the bitmap editor and then assign a macro to it.

WordPerfect's toolbars, in both versions, are less sophisticated graphically than Ami Pro's or Word's, but they still pack power. You can add an icon to the button bar for any menu command, and the button bar can display the icons as text, pictures, or pictures with text.

Microsoft Word requires more work and delivers fewer options: You must tunnel deep into a dialog box to make even the simplest change to the toolbar, it cannot be expanded beyond a fixed number of icons, and every icon is in black and white.

If you want your word processor to do *all* the work, macros can make the process completely automatic. Each product offers macros for customizing dialog boxes and creating icons. You can even link icons to specific tasks. For example, you could create an icon called Address; when you click on it, your company's address would be inserted in your document. Ami Pro's dialog editor provides extensive support for this type of customization.

You can create macros in all four applications by recording keystrokes, and you can edit or further customize your macros with each program's powerful macro language. Once you've defined or created macros, you can assign them to keystrokes, icons, or menus. You'll need some programming experience to take advantage of all the capabilities that these languages offer. If you have the skills, these programs have the power—and Ami Pro is the most powerful of all. *(continued on page 147)*

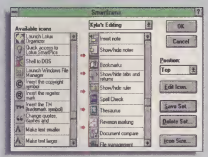
		Verdict
✓	**Lotus Ami Pro**	**10.0**
	WordPerfect 6.0 for DOS	8.8
	WordPerfect 5.2 for Windows	8.5
	Microsoft Word for Windows 2.0C	8.0

HAVE IT YOUR WAY

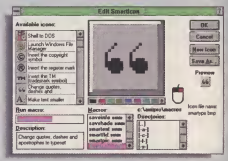
Ami Pro makes interface-lifts truly easy.

You can customize dialog boxes, icons, and entire toolbars using the dialog box editor and bitmap editor. And using Ami Pro's macro capabilities, you can assign specific tasks to an icon.

1. You can assign icons related to a particular task to an icon set. When you select the set, it appears in the position you have specified.

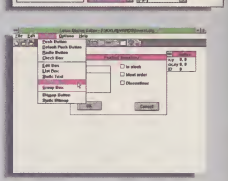


You can customize the graphics on an icon by using the bitmap editor.



2. Click on the SmartIcon symbol for a list of your SmartIcons sets. You can then have the set you choose appear either in the toolbar or as a floating palette.

You can create and modify your own dialog boxes. The dialog box editor provides elements such as push buttons, radio buttons, and check boxes.



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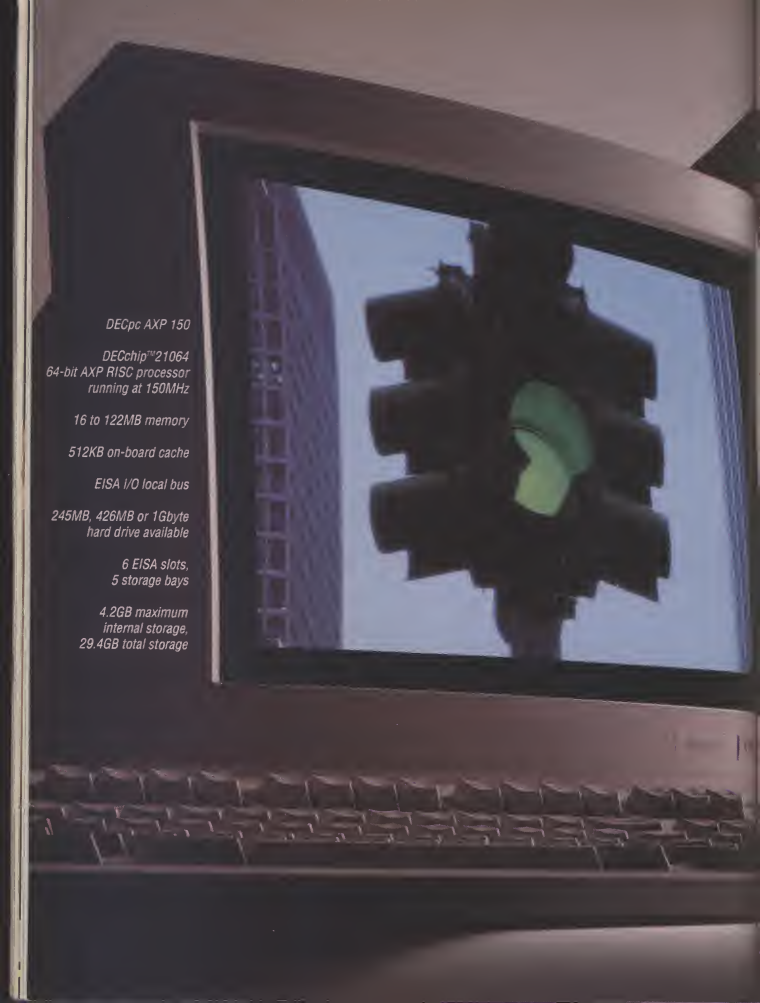

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Documentation and Support.....5%

Where do you turn when you haven't got all day (or all night) to figure out how a feature works? Is there any point at all in looking at the manual?

WordPerfect's support may be legendary, but Ami Pro takes top honors for overall excellence. Its well-organized documentation includes extensive graphics to support detailed explanations and a complete index—an essential tool for quick reminders. Separate volumes explain style sheets and Adobe Type Manager (which is included in the package). A quick-reference card describes SmartIcons and offers shortcuts, hints, and information on using frames. Lotus offers technical support via telephone, BBS, and fax.

Word's manual is also well organized and contains helpful illustrations. However, some of the technical descriptions are muddled, which will confuse readers. A Jump Start card offers tips to get you up to speed, and the back cover of the manual lists mouse and keyboard shortcuts. Separate manuals explain the draw, graph, and equation editor programs. A Getting Started guide answers commonly asked questions. In addition to telephone, fax, and BBS support, Microsoft offers a 24-hour Fast Tips line, which provides automated telephone support for commonly asked questions.

WordPerfect for Windows' documentation suffers from an alphabetical organization that makes using it tedious. For example, if you're looking for information on search and replace, you have to start under "Search" and finish under "Replace." This organization is especially tricky if you don't know the WordPerfect name for a word processing function. The documentation is packed with information, but there aren't as many graphics to illustrate concepts as in the Ami Pro and Word manuals.

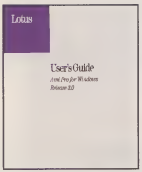
WordPerfect 6.0's manual, still in beta when we evaluated it, follows the same alphabetical organization. However, the topic discussions are organized by task, which provides a more complete picture for the user. Like WordPerfect for Windows, 6.0 will be backed by WordPerfect's no-nonsense toll-free tech support.

Our experience testifies that these companies provide superb technical support. When we made anonymous test calls, we got quick service (typically in less than five minutes) from technicians who really knew their stuff.

		Verdict
✓	**Lotus Ami Pro 3.0**	**9.6**
	Microsoft Word for Windows 2.0C	8.8
	WordPerfect 6.0 for DOS	8.5
	WordPerfect 5.2 for Windows	7.6

WHO YA GONNA CALL?

WordPerfect is a toll-free call away—but never on Sunday.

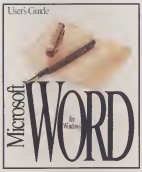


Lotus Ami Pro 3.0

Documentation: User's Guide, Style Sheet Guide, ATM User's Guide, and Quick Reference card.
Tech support by phone: Continuous toll-call support 8 a.m. Man–4 p.m. Sat. eastern time.
Plus: Fax-back service, BBS, CompuServe forum.

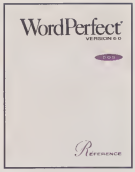
WordPerfect 5.2 for Windows

Documentation: Reference, Workbook, Shared Applications, Grammatik, and ATM User's Guide.
Tech support by phone: Toll free Mon.–Fri. 7–6 mountain time; toll call after hours Mon.–Sat.
Plus: Fax-back service, WordPerfect BBS, CompuServe forum.



Microsoft Word for Windows 2.0C

Documentation: User's Guide, User's Guide for Equation Editor, MS Graph, MS Draw, Getting Started, and Jump Start Card.
Tech support by phone: Toll call Mon.–Fri. 6–6 Pacific time.
Plus: 24-hour Fast Tips automated interactive support, fax-back service, CompuServe forum.



WordPerfect 6.0 for DOS

Documentation: Reference, Learning WP, Getting Started, WP Shell 4.0 Guide, and Quick Reference Card.
Tech support by phone: Toll free Mon.–Fri. 7–6 mountain time; toll call after hours Mon.–Sat.
Plus: Fax-back service, WordPerfect BBS, CompuServe forum.

Mail Merge.....5%

For mass mailings or routine correspondence, you need a mail-merge function that simply and elegantly merges two files. Good luck.

How hard can it be to merge two documents together? Our usability tests proved it's way harder than it needs to be. Testers struggled to perform a basic mail merge—and some never did complete it. They had the most success with Microsoft Word's mail-merge feature, which opens with a graphic showing how a data file merges with a header file.

Both Word and Ami Pro offer hints as you begin. If you need to create the data file before beginning the merge, Word opens a dialog box for creating fields for the header document. However, once past the opening screen, you are on your own—trial and error is your only friend. Ami Pro takes you to the same dialog box to create fields and enter data in the fields, and you enter data in an index-card format. In Microsoft Word, you enter your data into tables, which can be tricky.

There are no fancy graphics to guide you in either the Windows or the DOS version of WordPerfect and, without the documentation, there's little hope of success in the Windows version. You choose Merge from the Tools menu; then you have a range of confusing choices such as End Field, End Record, and Merge Codes.

In WordPerfect 6.0, your merge options are more specific and less intimidating than in WordPerfect 5.2 for Windows. First you select Merge from the Tools menu, then Define or Run, which seems easy enough. However, when you choose Define, you must decide if you are defining your form (letter) or your data in either text or table formats. That's where things get tricky. Creating data is easier in the table format, but you'll reach your goal only through extensive experimentation.

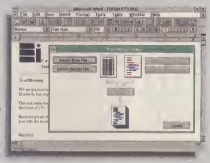
If you succeed in completing a merge, life gets easier. You can easily address envelopes in Ami Pro, Word, and WordPerfect 6.0. WordPerfect 6.0 will even insert PostNet information, which can slice a big chunk out of your postage bill. Word is the only program that won't let you create addresses on custom-sized envelopes—a minor shortcoming. All three programs will also recognize the address in your document and store a return address, and Ami Pro will store a database of addresses.

	Verdict
✓ **Microsoft Word for Windows 2.0C**	**9.0**
Lotus Ami Pro 3.0	7.0
WordPerfect 6.0 for DOS	5.0
WordPerfect 5.2 for Windows	4.0

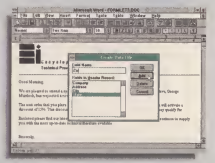
RETURN TO SENDER

No one does mail merge perfectly—Word comes the closest.

Microsoft Word designed usability into its mail-merge feature. It walks you through what is a painful process in other packages.

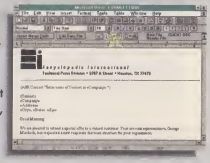


1. Select Print Merge from the File menu for a dialog box that shows each step of the process. It tells you to attach a data file or header file so it can access the data to be merged.



3. You can attach an existing data file, or Word will guide you through the process of creating one. It prompts you for field names and sets up a table for you to fill in.

2. In the main document, you can insert field names to help control the data merge—here, inserting ASK causes Word to prompt you for more information.



4. You can merge your data file and your main document into a single file containing each version of the document with its unique data, or print out all the documents directly.

When you already have a best seller like the KX-P1123 Dot Matrix Printer that delivers outstanding print quality, speed and reliability for the money, what do you do for an encore? We asked people just like you and they told us to make it quieter.

Quiet Technology for near laser-quiet operation.

WE ASKED PEOPLE HOW TO IMPROVE OUR BEST SELLING PRINTER. THEY TOLD US TO BE QUIET.

So, we added Panasonic's Quiet Technology and created the new KX-P2023 24-pin Dot Matrix printer. But, we didn't stop there. At the same time we made it easier on your ears, we made the KX-P2023 much easier to use with an all-new, user-friendlier control panel. We also made it easier to load and even more reliable with a belt-drive tractor feed and a simplified paper path. Plus, like all Panasonic Dot Matrix Printers, the KX-P2023 is backed by a two-year limited warranty.* No wonder the 1992 PC Magazine Service and Reliability Survey rated Panasonic "Excellent" on reliability, service and support.

Simplified Control Panel

Belt Drive Tractor Feed

Why would Panasonic take a proven winner and improve it? Because the surest way to create another best seller is by making things better.

*See your dealer for warranty details

Panasonic Office Automation

For more information visit your Panasonic dealer or call 1-800-742-8086.

PO10-PCC

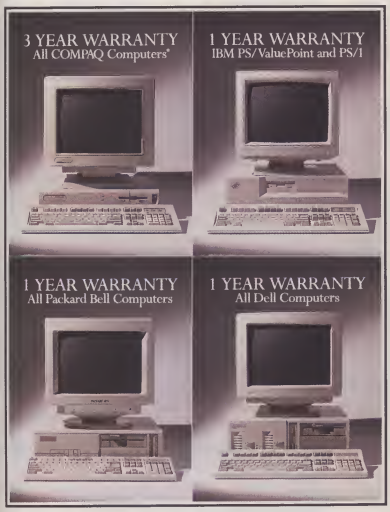
Circle 133 on reader service card.

PC/COMPUTING SCORECARD

Usability, features, and performance—Ami Pro is the overall winner.

Factors	Lotus Ami Pro 3.0	Microsoft Word For Windows 2.0C	WordPerfect 6.0 For DOS	WordPerfect 5.2 For Windows
Usability 30%	8.4 Second to Word, Ami Pro's ease of use excels in the complex categories of formatting, layout, and integration.	9.2 **Overall the easiest product to use, Word has document creation and editing and mail-merge tools that are especially user-friendly.**	7.0 WordPerfect 6.0 suffers from the usability limitations inherent in a DOS product.	8.1 Our testers found that WordPerfect for Windows' complex menu structures hinders its ease of use.
Document Creation and Editing 25%	9.8 Relying heavily on styles, Ami Pro offers tools for meeting everyday editing needs.	10 **Power combined with ease of use gives you the best capabilities for basic document processing.**	7.5 WordPerfect 6.0 offers all the necessary tools but sacrifices usability. Tables offer superior math functions.	7.0 WordPerfect for Windows lacks the ease of use designed into the others, but the underlying power is there.
Formatting and Layout 10%	9.5 **Easy-to-use frames unleash a tremendous amount of power to produce great-looking complex documents.**	7.5 The least powerful in the group, Word still offers a solid set of features that are easy to use.	8.5 The only product to offer a contour text wrap around graphics, WordPerfect 6.0 has an impressive set of layout tools.	8.0 Superb styles, columns, and graphics editing deliver what you need for highly formatted documents, but usability suffers.
Integration 10%	10 **Ami Pro provides solid integration within your environment, and automatic, easy-to-use links with other Lotus applications.**	8.0 Word offers seamless integration with other Windows applications through DDE and OLE.	6.5 Hindered by the DOS environment, WordPerfect 6.0's integration can't compare with the Windows packages.	8.5 In addition to DDE and OLE, WordPerfect for Windows supports VIM and MAPI e-mail formats for integration.
Performance 10%	9.5 **Lightning fast, Ami Pro prints almost before you know it. It merge-prints files 40 times faster than its closest competitor.**	6.2 You may get impatient waiting for Word to scroll, print, and print-merge, but you won't get bogged down when it saves or opens files.	7.5 You won't wait around for WordPerfect 6.0 to print, but you'll surely notice the time it takes for a print merge.	5.2 You'll have to wait for WordPerfect for Windows to scroll, print, print-merge, and even open and save files. It's the slowest of the lot.
Customizability 5%	10 **Customizing is a breeze with SmartIcons, a bitmap icon editor, powerful macros, and a dialog editor.**	8.0 Word's toolbar is difficult to customize, but WordBasic's macro language provides powerful customizing options.	8.8 Extensive button bar capabilities and a superb macro language create surprisingly rich options for a DOS product.	8.5 A versatile and flexible button bar plus a powerful macro language deliver customization power.
Documentation and Support 5%	9.6 **Ami Pro's documentation is well organized and contains many helpful graphics. Ami Pro offers extensive technical support.**	8.8 Word's extensive manual contains easy-to-find information. Phone hours are limited, but the technical staff is helpful.	8.5 Like WordPerfect for Windows, 6.0's documentation is alphabetical, but the task-oriented discussions are more comprehensive. Superb support.	7.6 WordPerfect for Windows' documentation is alphabetical, making it the least coherent of the Windows packages. Support is first rate.
Mail Merge 5%	7.0 Not quite up to par with Word, Ami offers some usability enhancements for its mail-merge tool.	9.0 **Usability testers judged Word's mail-merge tool the most effective.**	5.0 Just slightly easier to use than its Windows counterpart.	4.0 Complex menus and no user guidance make this an intimidating mail-merge tool.
Final Scores	☑ **92.0**	**87.2**	**73.6**	**73.4**

Our Competitors Are So Confident Of Their Products, They Guarantee Them To Last A Third As Long As Ours.



There's a common misconception today that computers are all alike. That they're made from the same components. That a box is a box is a box.

Well, here at Compaq, we have over 9,000 employees who could tell you why all PCs are not the same.

That there are important differences in quality. And reliability. And compatibility.

That, in the end, COMPAQ computers are designed to help you get more done with fewer problems.

The COMPAQ ProLinea, and all our affordable computers, feature high-performance processors from Intel.

But we also know that this could sound like an empty advertising promise if we didn't back it up. So we do.

Because unlike others who charge for extended coverage, all of our affordably priced PCs include a 3 year warranty with one year of on-site service.** Free.

And only a company that offers a better product can offer a better guarantee.

For a reseller near you, please call us at 1-800-345-1518. **COMPAQ**

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Circle 255 on reader service card.

Super Printers

They're big. They're smart. And they churn out pages faster than you can say "Save the Rainforest."

Here's the straight skinny on network printers: You want the biggest, baddest, fastest machines money can buy. Subtlety simply isn't appropriate here. No, you want through-the walls-speed, glass-smooth shading, and text so sharp it could cut your fingers. But don't stop there. Look for a printer that does more tricks than Lassie—like faxing, duplexing, or juggling all your fonts and forms. And while you're at it, get one you can hook to any network in less time than a visit to the DMV.

Three hot new super printers provide all of this and more, including built-in network interface cards, utterly painless setup, and super-convenient remote control from any desktop. What's more, they automatically sense and switch to the appropriate resolution, network protocol, and page-description language. Top this all off with sophisticated error recovery, and you have a truly super printer.

But what's the best one available today? To find out, we trucked the top heavyweights into our lab: the Compaq Pagemarq 20, the Hewlett-Packard LaserJet 4Si MX, and the Lexmark IBM LaserPrinter 4039-16L. Turn the page to see which one's right for you.

BY CYNDY BATES

HP LaserJet 4Si MX
HP continues to set laser printer standards. But this speedy, full-featured, easy-to-share printer comes at a steep price.

$5,499 list price, $4,399 street price

Hewlett-Packard; Direct Marketing Organization, P.O. Box 58059, MS511L-SJ, Santa Clara, CA 95051-8059; (800) 752-0900, (800) 387-3867 Canada

DECIDING FACTORS

The criteria for the perfect printer

Usability: Ease of Setup.....20%
This is where usability *really* counts. Setting up the printer and connecting it to a network should be a snap.

Print Speed.....20%
After waiting all day on Windows' slow performance, who wants to wait for output? The fastest at printing text and graphics wins this category.

Connectivity and Automation.....20%
You shouldn't have to worry about whether the printer will work with your network operating system. And it should have plenty of automated features so that it's easy to use in a centralized area.

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Compaq Pagemarq 20
Compaq's first printer earns high marks for its PostScript performance. In PCL mode, though, it has some catching up to do.

No list price, $3,599 street price

Compaq Computer Corp.; P.O. Box 692000, Houston, TX 77070; (800) 345-1518, (800) 263-5868 Canada, (713) 378-8820

Lexmark IBM LaserPrinter 4039-16L
Looking for easy setup? Intuitive utilities and detailed manuals make Lexmark's first network printer the most usable of the three.

$3,399 list price, $2,799 street price

Lexmark Int'l, 740 New Circle Rd., Lexington, KY 40511; (800) 358-5835, (800) 663-7968 Canada; (606) 232-2000

Output Quality 15%
We insist on crisp, well-defined characters and smoothly blended grays. You should too.

Fonts and Paper Handling.....15%
You want lots of fonts and a paper tray that never seems to run out. And tons of expansion options.

Ease of Maintenance 10%
Replacing the toner and getting to the printer's control panel should be quick and simple. And while you're at it, why not ask for readable, useful manuals?

HOW WE TESTED

Six keys to choosing the best printer.

Our six deciding factors are based on the features we think are critical for business work-group printing. But just because a feature exists doesn't mean the printer's performance or usability is up to snuff. To test speed, we timed how fast each printer output a 10-page text document (in both WordPerfect 5.1 for DOS and Word for Windows 2.0), a 100-page report including tables and clip art (produced in Word for Windows), and a PowerPoint presentation. We also invited business users into the *PC/Computing* Usability Lab to set up and configure each printer on our Ethernet-based Novell NetWare 3.11 network. They loaded the consumables, installed the network interface card, connected the printers to the network print queue, and then performed various maintenance tasks including replacing toner and recovering from a paper jam.

Usability: Ease of Setup ..20%

Installing the toner cartridge, connecting cables, and loading paper should be straightforward, but installing the network card and making the software connection to the network should also be a snap.

Print Speed 20%

The highest-scoring printers were consistently fast, both in PCL and PostScript modes and for text as well as graphics. Since the vast majority of business printing focuses on text documents, often with graphics, our evaluation placed more emphasis on these than on standalone graphics.

Connectivity/Automation 20%

It's worth paying a premium for the best network printers because they let you send any document—whether PCL or PostScript, 300 dots per inch or high resolution, graphics or text—to a centralized printer that will automatically switch modes to do the job. Another great advantage is versatile support of network operating systems and topologies. If your business is on a NetWare Token-Ring network today but wants to switch to a Windows NT Ethernet-based network a year from now, the printer should be adaptable. All you should have to do is switch interface cards.

Output Quality 15%

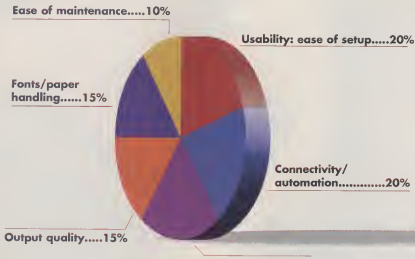
The business printing standard is 300 dpi, but for a competitive edge, printing at a higher resolution is key—especially for graphics such as charts, tables, logos, and business presentations. We compared both 300-dpi and high-resolution samples of text and graphics. Although all the printers produce attractive text, the best also print high-quality graphics.

Fonts/Paper Handling 15%

Recommended features include at least 43 resident scalable typefaces, paper capacity of at least 1,000 pages, expandability with font cartridge slots and other means of storing fonts, and optional paper trays and duplexers (for two-sided printing).

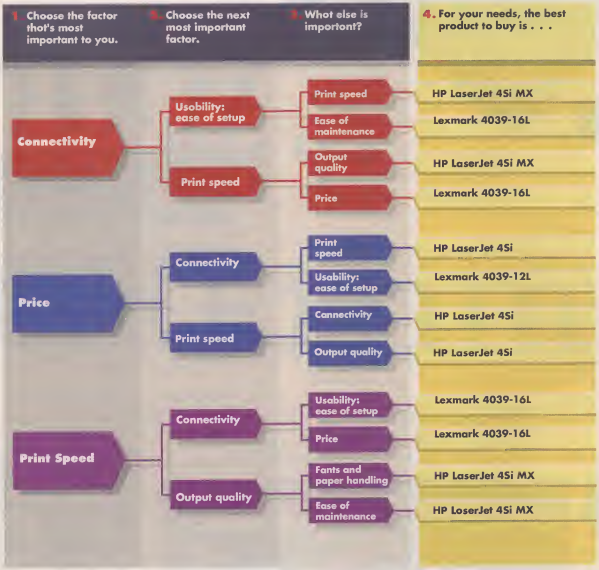
Ease of Maintenance 10%

In a business work group of 20 people or more, if a printer goes down and stays down it's a near-catastrophe. People can't do their jobs, so productivity suffers. For that reason, network printers have to be easy to maintain and to fix when problems occur. Routine tasks such as replacing paper and toner and recovering from paper jams should be a breeze. Basic troubleshooting requires an intuitive control panel, clearly written documentation, and outstanding service and support policies, including a toll-free support line and a one-year onsite warranty. A printer that meets your needs today may not meet them tomorrow, so upgrade paths, such as for updating a printer language, should be available.



PC/COMPUTING DECISION MAKER

Which laser printer solves your work group's printing needs?



HP LASERJET 4SI MX

The new standard in network printers.

PC Computing BEST

The biggest, baddest laser printer around is Hewlett-Packard's LaserJet 4Si MX. It's the fastest overall and affers the best combination of crisp text, fine dithering, and balanced grays—in both PCL and PostScript modes. You can hang it off nearly any network, and with its superb NetWare setup utilities it practically installs itself. Toss in plenty of expansian options, ample RAM and fonts, and generous paper capacity, and the HP is a clear winner.

Now's your

You wanted the power to choose from a world of different applications. DOS applications. Windows™ applications. OS/2® applications. OS/2 2.0 gave you the power. And the response was impressive, to say the least. Over two million copies shipped in less than one year. More than 1,200 OS/2 applications already available.* But now you want more. More features. More functions. More applications to choose from. That's why we're introducing OS/2 2.1.

The new OS/2 2.1 lets you run the latest Windows 3.1 applications, in addition to the DOS, Windows and OS/2 applications you can already run. We've also added TrueType fonts, select Windows applets, File Manager and support for Windows 3.1 printer and display drivers, including 32-bit seamless SVGA support. And now you can start DOS and OS/2 applications from a WIN-OS/2 session, too.

Portable users will be glad to know that OS/2 2.1 provides industry-standard Advanced Power Management (APM) support, to help extend battery life. We've made the cursor larger so it's easier to find your place on the screen. And OS/2 2.1 continues to exploit the very latest in technology. You'll find improved support for multi-media applications and pen-based capabilities, along with built-in CD-ROM and AS/400® terminal emulation support.

Of course, OS/2 2.1 still gives you true pre-emptive multitasking, superior OS/2 Crash Protection™ and the easy-to-use object-oriented Workplace Shell™ interface. All the features that made Version 2.0 an award-winner. But now, you also get a whole new world of possibilities.

There's no need to buy DOS and Windows to run DOS and Windows applications.

With OS/2 2.1 at the heart of your PC, you can run a world of DOS, Windows and OS/2 applications.

Introducing Version 2.1

chance to run the world.

OS/2 2.1 is now also available on CD-ROM. It comes with exciting multimedia samplers, full-motion video demos and more.

Demand OS/2 2.1 preloaded on your next PC.

With our free demo diskette, you can find out even more about all the powerful features OS/2 2.1 has to offer. For your copy, to find out more about OS/2 2.1, or to order, call **1 800 3-IBM-OS2.** In Canada, call **1 800 465-7999.**

Call for your free demo diskette.

Operate at a higher level.™

OS/2 2.1 Advantages

Improves productivity
- Now runs OS/2, DOS and new Windows 3.1 applications.
- New TrueType fonts, Windows applets, File Manager.
- Advanced Power Management (APM) support extends battery life for portables.
- OS/2 Crash Protection and pre-emptive multitasking.

Easy to use
- Now also available on CD-ROM.
- Object-oriented Workplace Shell interface.

Advanced 32-bit architecture
- Seamless SVGA support.
- Fully exploits latest multimedia applications.
- Supports CD-ROM, PCMCIA and pen technologies.

*To order CD-ROM with list of OS/2 applications, call Walnut Creek at 1 800 786-9907. IBM, AS/400 and OS/2 are registered trademarks and OS/2 Crash Protection, Workplace Shell and "Operate at a higher level" are trademarks of International Business Machines Corporation. Windows is a trademark of Microsoft Corporation. TrueType is a trademark of Apple Computer, Inc. ©1993 IBM Corp.

IBM®

Usability: Ease of Setup 20%

Setting up a network laser printer shouldn't be harder than cracking Rubik's Cube. Intuitive setup software and clear documentation to the rescue.

Setting up a network printer requires three steps: physically setting up the printer, installing the network card, and making the software connection to the network.

Up to the point when you install the network card, the physical setup of these printers is just as simple as that of any other laser printer. The process is the same, requiring you to install toner cartridges and paper cassettes and to connect power cables. Lexmark is the only manufacturer that preinstalls the toner cartridge.

Our usability testers completed the network card installation for each of the printers in 15 minutes or less. The Lexmark took the least time to install—averaging 10 minutes—thanks to its documentation.

The most complicated step in setting up a network printer is completing the software connection: attaching the printer to a file server, identifying the print queue, and installing printer drivers. The Lexmark's and the HP's Windows utilities and clear documentation enabled our testers to set up the printers faster, averaging 20 and 22 minutes, respectively, while the Compaq setup time averaged 37 minutes. The Compaq's DOS-based utility doesn't have the same point-and-click convenience.

These utilities make it easy to install printer drivers on each workstation. Under NetWare, the HP setup utility can automatically install a Windows driver on each workstation, saving the network administrator hours. First, the administrator associates the LaserJet 4Si MX driver with a print queue on the file server. When that print queue is selected at each workstation, the Windows driver is automatically installed, which means the administrator doesn't have to shlepp the driver disk from one workstation to the next.

The Lexmark's setup utilities also automate driver installation under NetWare. They will "look over" the applications on your hard drive and automatically install the appropriate printer drivers. Despite close competition from HP, the Lexmark's utilities combined with the the LaserPrinter's slight advantage in printer setup and network interface card installation put it ahead by a nose.

		Verdict
✓	**Lexmark IBM LaserPrinter 4039-16L**	**9.6**
	HP LaserJet 4Si MX	9.2
	Compaq Pagemarq 20	8.5

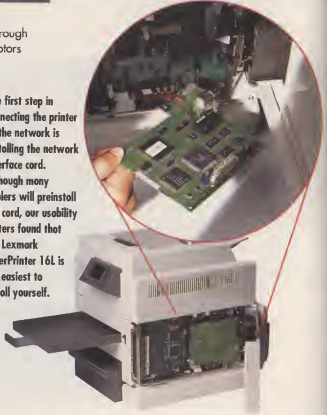
A USABILITY DREAM COME TRUE

The right software makes setup a cinch.

Grophical setup utilities help network professionols quick-step through the mind-numbing installation process. Even part-time administrators will find their lives less complicated.

Lexmark's Interact for Windows utility simplifies the network connection. Just point and click to connect the printer to the queue you want.

HP's JetAdmin for Windows is the most graceful and graphical setup utility: Dialog boxes walk you through NetWare configuration.



The first step in connecting the printer to the network is installing the network interface card. Although many dealers will preinstall the card, our usability testers found that the Lexmark LaserPrinter 16L is the easiest to install yourself.

A 1-2-3 you can really count on.

Talk about strength in numbers. Lotus® 1-2-3®, The World's Most Popular Spreadsheet,™ is now optimized for OS/2.® 1-2-3 for OS/2 offers the ease of use 1-2-3 is famous for, while exploiting the 32-bit power and advanced graphical environment of OS/2.

Lotus

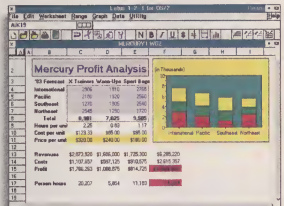
Now you can crunch nonstop with multithreaded background printing and Solver. With OS/2 Crash Protection,™ you can simultaneously print, recalculate and input data without thinking twice. And 1-2-3 for OS/2 takes full advantage of the Workplace Shell™ object-oriented interface. Drag and drop a data object onto the printer or shredder. Drop it onto the 1-2-3 program object, and OS/2 launches the application and loads the file in one simple step.

There are even more enhancements, like SmartIcons®—one click shortcuts to frequently used commands. The new Draw Layer lets you paste, position and size graphical objects from the OS/2 clipboard to anywhere on the worksheet. Plus you get features you already know, like true 3-D worksheets, Solver and BackSolver, file linking, and external database access.

Of course there's compatibility with previous 1-2-3 versions and other Lotus products, too. In fact, there's incredible integration when installed with Freelance Graphics® for OS/2. All in all, when you see how much it offers, you have to give this 1-2-3 a 10.

To order or to find out more about OS/2 2.1 or Lotus 1-2-3 for OS/2, call **1 800 3-IBM-OS2.**
In Canada, call **1 800 465-7999.**

Operate at a higher level.™



A true 32-bit implementation of Lotus advanced spreadsheet technology.

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IBM®

Print Speed.....20%

Since these work-group printers are directly connected to the network, they're faster than printers that have to pass through the print server bottleneck.

Three features allow these super printers to achieve top print speeds: a fast engine rated from 16 to 20 pages per minute, powerful RISC processors, and a direct connection to the network. Since they all have internal network interface cards, they eliminate the need for a dedicated PC or "black box" print server, thereby tripling print speed.

In our speed tests, the printer with the fastest engine was the best at printing our 10-page plain text document. Whether printing from DOS or Windows, the 20-ppm Compaq kept pumping pages through, averaging just over 10 pages of text per minute in PCL mode. Printing in high-resolution PostScript mode was slightly slower at about 8.5 pages per minute.

The 17-ppm HP, however, outstripped the Compaq when it came to printing our 100-page Word for Windows report combining text and graphics in PCL mode: the HP printed 11.4 ppm to the Compaq's 8.8 ppm. The reason? The LaserJet 4Si MX includes a newer version of PCL, called Enhanced PCL 5 (the same version found in the LaserJet 4), which incorporates data compression for faster graphics printing. The benefits of Enhanced PCL 5 really stood out when we printed the graphics-intensive PowerPoint presentation. The HP printed it more than three times faster than the Compaq.

The Lexmark has the slowest rated engine speed and printed the slowest overall in our tests. Its PCL performance, hindered by its print engine, averaged 1 page per minute slower than the HP. The Lexmark's performance was the slowest in our high-resolution PostScript tests, printing twice as slow as its 300-dpi mode.

So which printer is the fastest? We rate the HP's performance best overall, since it printed the PostScript documents and plain PCL text almost as fast as the Compaq (the HP averaged half a page per minute slower) and blew away the Compaq at printing our 100-page report and our presentation in PCL. Since today's work groups have to print complex documents with multiple fonts and business graphics such as tables or charts, the HP's versatility makes it the winner.

	Verdict
✓ **HP LaserJet 4Si MX**	**9.6**
Compaq Pagemarq 20	9.4
Lexmark IBM LaserPrinter 4039-16L	9.0

PUMPING PAGES

Any printer whips through text—graphics is something else.

HP's LaserJet 4Si MX is the Testarossa of shared printers—add graphics to the mix and it roars past the competition in PCL mode. The Compaq outran the HP in the PostScript tests—but just by a half-page per minute.

PCL Performance	10 pages text*	100 pages text with graphics	Presentation
Compaq Pagemarq 20 (300 dpi)	4% Faster	6% Faster	46% Slower
HP LaserJet 4Si MX (300 dpi)	1% Faster	37% Faster	170% Faster
Lexmark 16L (300 dpi)	8% Slower	24% Faster	3% Faster
HP LaserJet IIISi (300 dpi)	Baseline	Baseline	Baseline

High-Resolution PostScript Performance	10 pages text*	100 pages text with graphics	Presentatian
Compaq Pagemarq 20 (800 by 400 dpi)	2% Slower	17% Slower	49% Faster
HP LaserJet 4Si MX (600 by 600 dpi)	7% Slower	23% Slower	21% Faster
LexMark 16L (600 by 600 dpi)	25% Slower	50% Slower	19% Slower
HP LaserJet IIISi (300 by 300 dpi)	Baseline	Baseline	Baseline

*THESE TEST RESULTS ARE AN AVERAGE OF THE DOS AND WINDOWS DOCUMENTS' PRINT TIMES

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Connectivity and Automation.....20%

A work-group printer should be versatile enough to work with any network operating system you throw at it, and smart enough to let you manage it from anywhere.

The one area that distinguishes these printers from each other is their network connectivity: support of different network operating systems, topologies (Ethernet, Token-Ring, or AppleShare), and protocols. And here's where the Compaq shows its age, supporting only AppleShare and Novell's NetWare. Since the majority of networks are NetWare based, this isn't catastrophic. Compaq, however, has some serious catching up to do with its new Pagemarq iteration due out later this year.

The HP and the Lexmark both boast mean network support. Novell NetWare is available, of course, but both printers also support Microsoft LAN Manager and IBM LAN Server. HP supports Microsoft Windows NT and Unix-based networks such as SunOS, Solaris, and SCO Unix. Lexmark is planning on supporting Windows NT and Unix networks via software upgrades that should be available by the end of the year.

But what's unique about the HP and the Lexmark is that their interface cards support and automatically switch between multiple network protocols. This means you can not only use the same card if you change networks but also connect multiple networks to the same card.

The HP and the Lexmark simultaneously support multiple topologies, including Ethernet, Token-Ring, and AppleShare, and multiple network protocols. The HP is slightly more versatile, also supporting TCP/IP.

Once connected to the network, these printers offer top support for automated functions—and they should. When the network printer is located down the hall, it's crucial to be able to control the printer from the desktop. All three printers automatically switch printer languages by analyzing the data stream and switching languages accordingly. The HP is the only one that supports a context-sensitive switch—preserving downloaded fonts or macros in memory while it switches to another language. With all three printers, changing resolution is done automatically through the driver or the front control panel.

Which printer is best for networking? Not only does the HP offer automation features comparable to the other two printers', but it also provides the most extensive network support available.

		Verdict
✓	**HP LaserJet 4Si MX**	**9.8**
	Lexmark IBM LaserPrinter 4039-16L	9.0
	Compaq Pagemarq 20	8.6

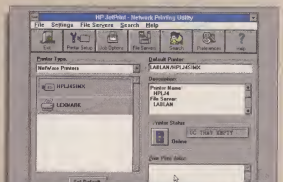
PRINTERS THAT TALK BACK

Great communicators for when the printer's half a floor away.

Find out from the comfort of your own office when the printer's out of paper, where you stand in the print queue pecking order, and how much printer memory's left for your favorite fonts.

No surprises here. Lexmark's Interact for Windows utility lets you point and click your way through crystal-clear reports on the status of the printer and the print queue.

Compaq's DOS-based Admin utility displays error messages, paper-tray status, and the amount of printer memory available.



You expect HP's JetPrint Windows utility to tell you when the paper tray's empty. Support for Standard Network Management Protocol is the big news—it lets network administrators check the LaserJet's status directly from their SNMP consoles.

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Output Quality.....15%

These printers offer the best of both worlds: the 300-dpi business standard as well as high-resolution PostScript printing.

All three of the super printers support resolutions higher than 300 dpi, which generally means better print quality. The HP and the Lexmark go up to 600 by 600 dpi (only the HP supports high resolution under PCL as well as PostScript) and the Compaq goes up to 800 by 400 dpi.

Does high-res printing make that much of a difference in quality? Yes, if you print graphics—even something as simple as a table with a shaded background. The more dots per inch, the better the toner can approximate letters or graphical elements. The reality is that for 12-point Courier or Helvetica, you won't see much improvement at higher resolutions. With Times or fancier typefaces, especially in boldface or italics, you may notice finer definition of serifs and curves, but only with close scrutiny. It's in graphics, which tend to have large areas of concentrated dots, where you will notice a quality improvement.

The HP and the Lexmark have two features that improve output quality, especially in high resolutions: microfine toner, which produces more precise dots with smaller particles, and edge-enhancement technology. The microfine toner results in less blurring of edges because the toner is better able to approximate curves. The Compaq also has edge enhancement, but lacks microfine toner and produces a more noticeable dot pattern in some graphics.

All three printers print text and graphics that will make your business look good. The Compaq printed attractive graphics in 800-by-400-dpi PostScript mode. The disappointment was that the high resolution degraded text quality by causing a stair-step effect on curves (although with 12-point type you have to look closely), so the text looked slightly worse than text printed at 300 dpi.

The Lexmark's high-res graphics are excellent, with a finer dithering pattern than the Compaq's. The more precise dot placement of higher resolutions can make text spidery and too light to read, but the Lexmark's text is solid and legible, although with some blurring at the edges.

The HP was the best for printing both text and graphics. Text was crisp and solid with well-defined edges. And the HP's high-resolution graphics printing was excellent for both PCL and PostScript. Output samples showed some banding, but overall the HP has the best print quality.

	Verdict
HP LaserJet 4Si MX	9.8
Lexmark IBM LaserPrinter 4039-16L	9.6
Compaq Pagemarq 20	9.2

THE HIGH-RESOLUTION DIFFERENCE

If 300-dpi output looks good, why go for a higher resolution?

You'll need a magnifying glass to see the difference when you print text at 600 dpi, but graphics are another story. This is why a high-resolution printer is a must for your reports and presentations.

HP LASERJET IIISI
- 300 by 300 dpi
- PostScript

Because the dots are bigger, shading looks clunky.

HP LASERJET 4SI MX
- 600 by 600 dpi
- PCL

Microfine toner and 600-dpi resolution (which the HP prints in PCL and PostScript) smooth out graphics.

LEXMARK LASERPRINTER16L
- 600 by 600 dpi
- PostScript

Higher resolution and microfine toner produce great-looking grays.

COMPAQ PAGEMARQ 20
- 800 by 400 dpi
- PostScript

The lack of microfine toner makes the dot pattern more noticeable.

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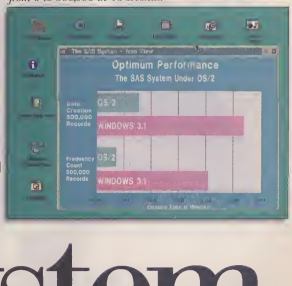

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Fonts and Paper Handling 15%

A work-group printer handles enough fonts to create attention-getting documents and holds enough paper to make any tree hugger cringe.

With these high-end printers, you'd expect a large selection of scalable fonts (at least 43), a huge paper capacity (at least 1,000 sheets), and expansion options to please even the most demanding work group. Anything less is skimping.

Of the three printers, only the HP goes all out, providing a total of 80 scalable fonts—35 PostScript fonts, 35 Intellifont fonts for PCL, and, as a bonus, 10 TrueType fonts under PCL to match those in Windows 3.1. Lexmark falls into the middle ground with 39 PostScript fonts plus 13 PCL fonts. The Compaq has the bare-bones font requirements: the standard 35 PostScript fonts and 8 Intellifont fonts for PCL.

The HP's selection of built-in fonts—plenty for any business—virtually eliminates the need for font expansion, so it's not a problem that the HP offers only two HP-standard font cartridge slots. Another benefit of the HP is that when you download fonts to printer RAM, it saves the fonts in memory when the printer switches languages.

The Lexmark and the Compaq offer more font expansion options than the HP, but they don't compensate for the printers' limited font selections. Both provide 1MB or 2MB flash memory modules to store downloaded fonts. The Lexmark also supports proprietary credit-card-size IC font cards, which contain scalable and/or bit-mapped fonts and work just like font cartridges. The Compaq doesn't support font cards or cartridges, but it offers an optional 60MB internal hard drive to store extra fonts.

The HP also outshines the competition when it comes to high-volume paper handling. It offers not only a 1,000-sheet input capacity, but also the best expansion options, including an additional 1,500-sheet input feeder, a 2,000-sheet output stacker, and duplexing (two-sided printing). The Compaq, while it holds 1,500 sheets of paper and supports tabloid size, isn't expandable. The Lexmark offers an optional 500-sheet paper drawer in addition to its 500-sheet standard paper feed.

The printer with the best font support and paper handling is the HP. Its generous supply of fonts and 1,000-sheet paper capacity are plenty for most network business printing, but if you need more, the HP has the options.

		Verdict
✓	**HP LaserJet 4Si MX**	**9.1**
	Compaq Pagemarq 20	8.9
	Lexmark IBM LaserPrinter 4039-16L	8.9

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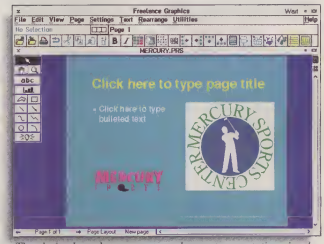

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Ease of Maintenance 10%

Insist on an intuitive control panel, excellent documentation, a one-year onsite warranty, and toll-free technical support.

To rate the ease of maintaining the super printers on a daily basis, we had our usability testers perform a number of tasks, including switching the printer's page language, changing the default font, restocking paper, and recovering from a paper jam.

The Lexmark and HP printers proved to be easiest, with the testers taking 8 and 10 minutes, respectively, to finish the tasks compared to the Compaq, which took almost an hour. Compaq testers had problems with three of the four tasks (switching the printer language was the only task that proved trouble-free), as well as with figuring out how to save their menu selections. Because the Lexmark took the least time in our tests and our testers found its control panel to be the most intuitive, it rates highest for ease of maintenance.

Other considerations for ease of printer maintenance are documentation, warranty, and support. Each of the three printers' documentation was exhaustive, including a user or operator guide with detailed troubleshooting sections, glossaries of LED error messages, and directions for clearing paper jams and improving print quality. The Lexmark, in fact, has an entire manual devoted to diagnosis and servicing of printer problems—probably more than you or your network administrator would ever want to know; nevertheless it shows careful attention to detail.

All three printers have one-year onsite warranties, which you should consider mandatory. But you'll want to check what the average response time is. This will vary from dealer to dealer, but we'd recommend purchasing a 4-hour response option, rather than the standard 24-hour option. You may have to pay extra but it's worth it, especially when an entire work group can't print.

Although Hewlett-Packard's widespread availability of supplies and service centers is a big plus, the Lexmark has the edge for ease of maintenance with its intuitive control panel and detailed documentation; it also weighs less than half what the HP does, and it's the most easily upgradable. For example, upgrading to PostScript Level 2 (available later this year) will be as easy as adding SIMM memory.

		Verdict
✓	**Lexmark IBM LaserPrinter 4039-16L**	**9.8**
	HP LaserJet 4Si MX	9.5
	Compaq Pagemarq 20	9.2

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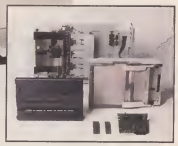
Smart designs keep your work group up and running.

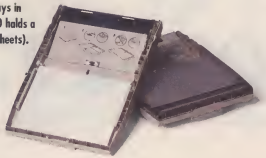
Changing a toner cartridge, refilling an empty paper tray, or diagnosing a paper jam shouldn't feel like torture. The right design can make a printer a thing of beauty, but the wrong design can make it a pain to maintain.

The Lexmark's easy-to-understand control panel and menu system won fans in our Usability Lab.

HP's biggest maintenance advantage is one you can't see: the availability of parts through its nationwide network of supply and service centers.



Each of the three TwinTrays in the Compaq Pagemarq 20 holds a full ream of paper (500 sheets).



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February 9, 1993

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PC/COMPUTING SCORECARD

The HP LaserJet 4Si MX outpaces, outconnects, and outshines its output rivals.

Factors	HP LaserJet 4Si MX		Lexmark IBM LaserPrinter 4039-16L		Compaq Pagemarq 20	
Usability: Ease of Setup 20%	9.2	Setup and configuration tasks aren't as logical as the Lexmark's, but the HP runs a close second with preinstalled network cards and Windows-based network setup utilities. HP's JetPrint user utility automates Windows driver installation in Novell networks.	9.6	**Overall the most usable printer, the Lexmark required less than an hour to set up and configure thanks to its crystal-clear documentation, comprehensive network utilities, and easy card installation.**	8.5	The least usable printer, the Compaq averaged 90 minutes to set up and attach to the network. Its DOS-based utilities have a graphical look but lack point-and-click convenience. Despite Compaq's solid documentation, Lexmark and HP automate more of the process.
Print Speed 20%	9.6	**The all-around speediest printer, the HP is fast at printing text or graphics, PCL or PostScript, and 300-dpi or higher resolution. Enhanced PCL 5 data compression blazes through Windows.**	9.0	With the slowest rated engine speed, the Lexmark includes a Windows driver to help speed up PCL printing, especially documents with graphics or highly formatted text. Printing PostScript at 600 dpi rather than 300 dpi cuts performance in half.	9.4	For printing PostScript files—whether reports, memos, or presentations—the Compaq's fast, 20-ppm print engine just edges out the HP. Its PCL 5 emulation, however, crawls by for multiple font changes, simple tables in text documents, or graphics.
Connectivity and Automation 20%	9.8	**The most versatile printer, the HP supports ten NOS's and automatically switches between them. It also switches printer languages, interfaces, and resolutions on the fly.**	9.0	The Lexmark also automatically switches between supported NOS's but doesn't support as many as the HP. Windows NT and TCP/IP support are due by 1994. It also automatically switches printer languages, interfaces, and resolutions.	8.6	The Compaq's automated features include auto-switching between printer languages, interfaces, and resolutions, but its network support suffers. Currently, the Compaq supports only NetWare and AppleShare, but additional support is due by year's end.
Output Quality 15%	9.8	**With the highest output quality, the HP prints at 600 dpi in PostScript and PCL modes. Using microfine toner particles and RET edge enhancement, it prints crisp characters and a balanced range of grays.**	9.6	The Lexmark prints solid black, legible text, and good-looking graphics. The Lexmark's 600-dpi resolution is available only with its PostScript Level 1 mode, but it prints a dithering pattern fine enough to rival HP's print quality.	9.2	The Compaq rated the lowest for print quality, but its output is good enough for business documents. Graphics print quality in high-resolution PostScript—though not as good as the HP's or the Lexmark's—was excellent. PCL output and PostScript text were weak.
Fonts and Paper Handling 15%	9.1	**The HP offers the best balance of standard configuration and expansion options. It includes the most resident scalable fonts (80) and 1,000-sheet paper input, as well as two-sided printing.**	8.9	The Lexmark has 52 scalable fonts—more than the Compaq, but less than the HP. Its 500-sheet paper tray doesn't stack up for work-group printing. Expansion options include a second 500-sheet drawer, and a memory module and IC card slots for fonts.	8.9	The Compaq's standard paper configuration—a 1,500-sheet input capacity—is the largest of these printers, but it isn't expandable. The minimal set of 43 fonts, however, is expandable with an optional 60MB hard drive.
Ease of Maintenance 10%	9.5	The HP, although easy to use, isn't quite as simple as the Lexmark. Although the control panel is accessible, the Lexmark's is more intuitive. The HP includes automatic error recovery, a one-year onsite warranty, and detailed documentation.	9.8	**The Lexmark is the easiest to maintain. It's simple to clear paper jams and reset the control panel. It also weighs much less than the HP, has the most intuitive control panel, and is the easiest to upgrade.**	9.2	Despite better customer support than HP or Lexmark, the Compaq trails in usability by complicating even simple tasks such as filling paper trays. In its favor, the Compaq is the only printer with a toll-free customer support line open 24 hours a day.
Total Score	✓	**95.1**		**92.8**		**89.4**

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NETWORK WORKHORSES

They're faster—and smarter—than the average laser printer.

	Compaq Pagemarq 20	HP LaserJet 4Si MX	Lexmark IBM LaserPrinter 4039-16L	HP LaserJet IIISi (baseline comparison)
Suggested list price	N/A	$5,499	$3,399	N/A (discontinued)
Estimated street price	$3,599	$4,399	$2,799	$3,299
FEATURES				
Printer languages	PCL 5, PostScript 2	PCL 5E, PostScript 2	PCL 5, PostScript 1	PCL 5
Scalable fonts	35 PostScript, 8 PCL	35 PostScript, 45 PCL	39 PostScript, 13 PCL	13 PCL
Standard RAM/ maximum RAM	4MB/20MB	10MB/26MB	4MB/16MB	1MB/17MB
Maximum resolution	800 by 400 dpi PostScript	600 by 600 dpi PCL and PostScript	600 by 600 dpi PostScript	300 by 300 PCL
Print engine	20-ppm Fuji Xerox	17-ppm Canon NX	16-ppm Lexmark	17-ppm Canon NX
Standard interfaces	Fast parallel, serial, 1 open slot	Fast parallel, LocalTalk, Ethernet	Fast parallel, serial, 1 open slot	Parallel, serial, 1 open slot
Processor	20MHz AMD 29000 RISC w/128K cache	25MHz Intel 80960CF RISC	20MHz AMD 29000 RISC	16MHz AMD 29000 RISC
CAPABILITIES				
Paper input	1,500 sheets	1,000 sheets, optional 1,500-sheet tray	500 sheets, optional 500-sheet tray	1,000 sheets, optional 1,500-sheet tray
Paper output	500 sheets with bin-full sensor	500 sheets with bin-full sensor and print-job offset	500 sheets with bin-full sensor	500 sheets with bin-full sensor and print-job offset
Media sizes supported	Tabloid, legal, letter, A4	Legal, letter, A4	Legal, letter, A4	Legal, letter, A4
Cost per page	1.7¢	1.9¢	2.1¢	1.9¢
Footprint	349 square inches	505 square inches	313 square inches	505 square inches
Weight	83 pounds	106 pounds	46 pounds	106 pounds
Warranty	1-year onsite	1-year onsite	1-year onsite	1-year onsite
Support	Toll-free support 24 hours/7 days a week, CompuServe forum, Compaq BBS, fax-back service	Toll call Mon.–Fri. 7–6 mountain time (except Wed. 7–4), CompuServe forum, fax-back service, audio tips	Toll call Mon.–Fri. 9–7 eastern time, Lexmark BBS, fax-back service	Toll call Mon.–Fri. 7–6 mountain time (except Wed. 7–4), CompuServe forum, fax-back service, audio tips
NETWORKING				
Monthly duty cycle	50,000 pages	75,000 pages	75,000 pages	50,000 pages
Network operating systems operated through direct connections	Novell NetWare, AppleShare	Novell NetWare, MS Windows for Workgroups, MS Windows NT, MS LAN Manager, IBM LANServer, AppleShare, HP-UX, SunOS, Solaris, SCO Unix	Novell NetWare, MS LAN Manager, IBM LAN Server, AIX, AppleShare	Same as HP LaserJet 4Si MX with optional HP JetDirect network interface card
Network protocols supported	IPX, AppleTalk	IPX, DLC/LLC, TCP/IP, AppleTalk	IPX, DLC/LLC, AppleTalk, Lexlink	IPX, DLC/LLC, TCP/IP, AppleTalk
Network interface options	Ethernet 10base2 thin wire and 10baseT twisted pair, Token-Ring, LocalTalk	Ethernet 10base2 and 10baseT, Token-Ring, Ethertalk, LocalTalk, HP-UX, Sun Unix	Ethernet 10base2 and 10baseT, Token-Ring, LocalTalk	Ethernet 10base2, Ethernet 10baseT, Token-Ring, LocalTalk, HP-UX, Sun Unix
Special features	Upgradable NIC firmware, prints on tabloid paper, optional PostScript fax, optional flash memory for storing fonts, optional 60MB internal hard disk, optional envelope feeder	Supports simultaneous multiple NOS, auto-error recovery, SNMP support, optional paper envelope feeder, optional duplexing	Supports simultaneous multiple NOS, auto-error recovery, upgradable NIC and printer firmware, and optional envelope feeder, duplexing, and flash memory	Optional power envelope feeder

ALL PRINTERS INCLUDE CHARACTER-EDGE ENHANCEMENT FOR SMOOTHING CURVED TYPE EDGES. ALL PRINTERS EXCEPT THE LASERJET IIISI AUTOMATICALLY SWITCH PRINTER LANGUAGES, HAVE SIMULTANEOUSLY ACTIVE INTERFACES, AND CAN STORE PRINT JOBS IN AN INTERNAL PRINT BUFFER

He was a sales force of one. Until he got CompuServe. Now he's a force to be reckoned with.

He was confident he could sell just about anything to just about anyone. There was only one catch. The competition wasn't scared. He was.

But then he got CompuServe, and people noticed – clients and competition alike.

That's the impact of CompuServe. The information service that links you to information and resources typically available only to big companies.

Make more contacts than ever, with E-mail, fax capabilities, and international communications (for the price of a local phone call). Access dozens of professional forums and share information with industry insiders and experts. Compile research on markets, prospects, and competitors through reference libraries containing archived, full text from thousands of magazines, newspapers, newsletters, and other sources. Pull news off the wire as it happens. Book flights and hotels directly. There's even hardware and software support, because you don't have time for downtime.

A one-time membership fee and $8.95 a month let you use our basic services as often as you like. You'll receive the first month free. Plus, there are hundreds of other services available at nominal additional charges. For more information or to order, see your computer dealer or call 1 800 848-8199. Outside the U.S. and Canada, call 1 614 457-0802.

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The information service you won't outgrow.™

Circle 128 on reader service card.

Printer Overkill?

When you can't afford the very best, get the next best thing.

Not every business has the budget for a top-of-the-line laser printer. But how do you know what you can live without? We looked at lower-priced printers in the Hewlett-Packard, Compaq, and Lexmark families that offer direct network connections without all the bells and whistles of the high-priced versions.

HP LaserJet 4Si

$3,749 list price, $3,099 street price • Hewlett-Packard • Direct Marketing Organization, P.O. Box 58059 MS511L-SJ, Santa Clara, CA 95051-8059 • (800) 752-0900

The LaserJet 4Si is the only alternative we looked at that provides full-speed performance for less money than its higher-end sibling, the LaserJet 4Si MX. The 4Si uses the same 17-ppm, 600-dpi-capable engine as the 4Si MX. But the 4Si has only one printer-language standard—Enhanced PCL 5—and has open interface slots, in addition to the standard parallel and serial ports. Other differences include 2MB of RAM standard and 45 scalable typefaces.

The 4Si is fully upgradable to the 4Si MX. A PostScript Level 2 upgrade is available for $799, and Hewlett-Packard JetDirect network interfaces are available to add full network support, including support for simultaneous multiple network operating systems.

HP LaserJet 4

$1,759 list price, $1,399 street price • Hewlett-Packard • Direct Marketing Organization, P.O. Box 58059 MS511L-SJ, Santa Clara, CA 95051-8059 • (800) 752-0900

The LaserJet 4 is the original 600-dpi trendsetter. It may have only an 8-ppm print engine, but with a $1,759 list price, it's the bargain hunter's dream laser printer. Using the same Hewlett-Packard JetDirect cards that the LaserJet 4Si does, the LaserJet 4 offers small work groups (ten people or less) virtually identical network functionality, supporting the same four network protocols and ten network operating systems. The only difference is that the LaserJet 4 supports multiple network operating systems, although not simultaneously.

The LaserJet 4 comes standard with Enhanced PCL 5, 2MB of RAM, and 45 scalable typefaces. Like the LaserJet 4Si, the LaserJet 4 is upgradable to PostScript Level 2 and automatically switches between languages. The LaserJet 4 supports up to 600-by-600-dpi resolution without a performance hit and has excellent text and graphics print quality for both text and graphics.

The low monthly rated duty cycle (20,000 pages) and slow print engine limit this printer to four- to ten-person work groups. Although the LaserJet 4 has the slowest print engine of all the network printers we looked at, it didn't finish last as you might expect. While it finished near the bottom of the pack for printing text, its Enhanced PCL 5 put it in the top third at printing graphics—it even beat out some 17-ppm printers. For small work groups, the the LaserJet 4 is the best value.

Compaq Pagemarq 15

$2,599 street price • Compaq Computer Corp. • P.O. Box 692000, Houston, TX 77269-2000 • (800) 345-1518

Compaq's strategy for a low-cost alternative to its Pagemarq 20 was to offer the same features and functionality in a slower model. The main differences are the

HOW FAST DO YOU WANT IT?

When the price drops, so does performance.

Compared to the super printers, you sacrifice only about a page per minute with these lower-cost siblings. HP's upgradable LaserJet 4Si, with its 17-ppm engine, is the fastest of the bunch.

PCL Performance	10 pages text	100 pages text with graphics	Presentation
Compaq Pagemarq 15	10% Slower	8% Slower	54% Slower
HP LaserJet 4	37% Slower	15% Slower	55% Faster
HP LaserJet 4Si	1% Faster	37% Faster	170% Faster
Lexmark 12L	15% Slower	9% Faster	9% Slower
HP LaserJet IIISi	Baseline	Baseline	Baseline

ALL PRINTERS TESTED AT 300 DPI IN PCL MODE OVER ETHERNET-BASED NOVELL NETWARE 3.11 NETWORK.

Pagemarq 15's 15-ppm print engine, smaller 750-sheet standard paper tray, and slower 16MHz RISC processor. Like the Pagemarq 20, however, it includes PCL 5 and PostScript Level 2 (automatically switching between them), and 4MB of RAM, and supports up to 800-by-400 resolution under PostScript. The Pagemarq 15 supports the same protocols and network operating systems as the Pagemarq 20 (Novell NetWare and AppleShare).

With a street price of around $2,599, the Compaq Pagemarq 15 is priced a few hundred dollars less than the 16-ppm Lexmark 16L and is just as fast at printing straight text. Like the Pagemarq 20, the Pagemarq 15 really slows down when printing PCL graphics (they use the same PCL 5 emulation). The Pagemarq 15 in PCL mode printed our PowerPoint presentation slower than all the network printers we tested, including the 8-ppm LaserJet 4.

Lexmark IBM LaserPrinter 4039-12L

$2,899 list price, $2,499 street price • Lexmark Int'l • 740 New Circle Rd., Lexington, KY 40511 • (800) 358-5835

Like Compaq, Lexmark/IBM offers a slower printer with virtually the same features as its top-of-the-line model. The 12-ppm Lexmark 12L uses the same network cards as the 16L, giving it the same network support and functionality. One advantage Lexmark printers have over the other network printers we looked at is their ease of upgradability.

In addition to a slower print engine, the Lexmark 12L also has a slightly slower processor—16MHz instead of 20MHz. However, the Lexmark 12L averaged only 1 ppm slower than the Lexmark 16L. In fact, at $500 less than the Lexmark 16L, the Lexmark 12L is one of the best lower-priced values. You won't miss the print speed you sacrifice, and you'll save some money in the process.

LOW-COST LEADERS

Do you really need an extra page a minute when you can save $1,000?

	Compaq Pagemarq 15	HP LaserJet 4Si	HP LaserJet 4	Lexmark IBM LaserPrinter 4039-12L
List price	N/A	$3,749	$1,759	$2,899
Estimated street price	$2,599	$3,099	$1,399	$2,499
FEATURES				
Printer languages	PCL 5, PostScript 2	Enhanced PCL 5	Enhanced PCL 5	PCL 5, PostScript 1
Scalable fonts	35 PostScript, 8 PCL	35 Intellifont, 10 TrueType	35 Intellifont, 10 TrueType	39 PostScript, 13 PCL
Standard RAM/ maximum RAM	4MB/18MB	2MB/34MB	2MB/32MB	4MB/16MB
Maximum resolution	800 by 400 dpi PostScript	600 by 600 dpi PCL	600 by 600 dpi PCL	600 by 600 dpi PostScript
Print engine	15-ppm Fuji Xerox	17-ppm Canon	8-ppm Canon EXP	12-ppm Lexmark
Processor	16MHz AMD 29000 RISC	25MHz Intel 80960CF RISC	20MHz 80960KA Intel RISC	16MHz AMD 29200 RISC
Interfaces	Fast parallel, serial, optional Ethernet, Token-Ring, AppleTalk	Fast parallel, optional Ethernet, Token-Ring, AppleTalk	Fast parallel, serial, optional Ethernet, Token-Ring, AppleTalk	Fast parallel, serial, optional Ethernet, Token-Ring, AppleTalk
CAPABILITIES				
Paper input/output	750 sheets/500 sheets	1,000 sheets/500 sheets	350 sheets/250 sheets	500 sheets/500 sheets
Cost per page	1.7¢	1.9¢	2.5¢	2.8¢
Footprint	313 square inches	505 square inches	257 square inches	313 square inches
Weight	65 pounds	106 pounds	38 pounds	46 pounds
Warranty	1 year onsite	1 year onsite	1 year	1 year onsite
Monthly duty cycle	50,000 pages	75,000 pages	20,000 pages	50,000 pages
Supports simultaneous multiple NOS*	NetWare and AppleShare only	Yes, all supported NOS's	No	Yes, all supported NOS's
Special features	Auto-language switching, all ports active, prints on tabloid paper, optional PostScript fax	Auto-language switching, all ports active, auto-error recovery, optional duplexer	Auto-language switching, all ports active, auto-error recovery, optional power envelope feeder	Auto-language switching, all ports active, auto-error recovery, optional duplexer

*THESE PRINTERS HAVE THE SAME NETWORK CONNECTABILITY (NOS, PROTOCOLS, AND TOPOLOGIES SUPPORTED) AS THEIR HIGH-END SIBLINGS. THE EXCEPTION IS THE LASERJET 4, WHICH SUPPORTS THE SAME NOS'S AND PROTOCOLS AS THE LASERJET 4Si MX, BUT SUPPORTS THEM ONE AT A TIME, NOT SIMULTANEOUSLY.

FIVE REASONS WHY SOUND BLASTER 16 REDEFINES PC AUDIO.

1.

Better sound quality.

First things first: the Sound Blaster™ 16 from Creative Labs delivers exceptional quality audio for your PC.

Just how good? Let's put it this way: at the heart of the Sound Blaster 16 is the same 90dB digital audio Codec that drives studio-grade DAT players.

And speaking of studio-quality sound, we've built in sophisticated features like a programmable mixer with separate treble, bass, and gain controls for each input, multiple-source 16-bit audio sampling, record and playback, full MIDI capability and a 20-voice FM synthesizer. So, from sizzling highs to pulse-pounding bass, no other audio card compares to Sound Blaster 16's concert-hall fidelity.

2.

More compatible.

Unlike other cards claiming "Sound Blaster compatibility," the Sound Blaster 16 is 100% compatible with every software application ever written for the Sound Blaster.

Which is to say, virtually every application available for sound. Whatever the application, it works better—and sounds better—on a Sound Blaster 16.

And with Sound Blaster 16 it's easy to add CD-ROM—the interface is built right onto the card, so you don't use up an expansion slot. There's no problem with SCSI incompatibility either, and no need to fuss with manual switch settings to get industry-standard Sound Blaster performance.

3.

Easy to upgrade.

Sound Blaster 16's unique modular, scalable platform allows you to add more advanced features and technologies as you need them.

Upgrade to Advanced Signal Processing with one chip.

Like our Advanced Signal Processing option that delivers 4:1 real-time hardware data compression, reducing CPU usage up to 65%.

It's perfect for use with large or complex sound files. And it's built on a single chip that mounts directly into the Sound Blaster 16 card, so hardware installation is a matter of seconds.

Or maybe you're ready to upgrade your MIDI applications with next-generation sampled wave synthesis—the same technology used in the professional music and recording industries. With Sound Blaster 16, *it's literally as simple as plug and play.* Add a Wave Blaster™ daughter board and you've got over 250 sampled sounds—everything from a 9-foot Kawai® concert grand piano to ear splitting electric guitar effects—right at your fingertips.

Upgrading is as simple as plugging in a daughter board.

4.

VoiceAssist™ speech recognition...and more.

As if that weren't enough, the Sound Blaster 16 package includes the biggest breakthrough in PC control since the invention of the mouse.

Our exclusive VoiceAssist speech recognition software is a sophisticated input device that gives you *hands-free control of Windows applications with a high-accuracy library of 30,000 voice commands.* And it's free with your Sound Blaster 16. We even include the high performance microphone that goes with it.

But that's not all. Inside your Sound Blaster 16 package is *more than $1,000 in added value software.* Best-selling titles like Monologue™ text-to-speech conversion utility, Software Toolworks® Multimedia Encyclopedia®, PC Animate Plus™ and HCS Interactive™ for Windows.

Hands-free voice control.

5.

The bottom line: Value.

It's all pretty impressive when you stack up the Sound Blaster 16 next to other 16-bit sound cards. And even more impressive when you compare price tags.

	CREATIVE LABS SOUND BLASTER 16	MEDIA VISION PRO AUDIO SPECTRUM 16
Sound Quality		
Playback rate	44.1 KHz	44.1 KHz
Dynamic Range	85dB	84dB
Signal-to-Noise	85dB	80dB
Upgradability		
Advanced Signal Processing	Yes	None
Sampled Wave Synthesis	Wave Blaster	None
Speech Recognition	VoiceAssist Software included	Optional kit sold separately ($79)
Bundled Software	Multimedia Encyclopedia HCS Interactive PC Animate Plus Monologue for Windows 10 DOS/Windows utilities	5 DOS/Windows utilities
Compatibility	100% compatible with all Sound Blaster software	8-bit Sound Blaster only (with switched emulation)

Because when it comes to audio fidelity, features, and flat-out, bottom-line value, Sound Blaster 16 is more than just a new sound card—it's the new definition of PC audio.

For more information about Creative Labs products and the name of your nearest Creative Labs Dealer, call 1-800-998-5227.

Sound BLASTER™ CREATIVE™ CREATIVE LABS, INC.

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Circle 211 on reader service card.

Got Hardware Problems?

Two hardware adapters or devices trying to grab the same resources spells trouble for your whole system. Here's how to find your way out of thorny device conflicts.

By Sally Neuman

YOUR PC IS A HOUSE OF CARDS. You've already added a SoundBlaster and a SCSI adapter. But the next joker you deal might bring down the house. And then where are you? Your system refuses to boot, your mouse zigs when it should zag, and your most important file turns to digital mush. Blame it on device conflicts. These conflicts occur when more than one adapter board attempts to use the same system resource in the same instant.

The four resources that hardware adapters fight over include interrupt request (IRQ) lines, channels through which the adapter requests service from the CPU; input/output (I/O) addresses, physical locations on the system's bus or within RAM where the intelligence for the adapter is found; direct memory access (DMA) channels, channels through which devices and software communicate in a system's RAM; and upper memory blocks (UMB), the RAM address range between the top of conventional memory (640K) and the bottom of extended or expanded memory (1,024K) where your adapters hold their RAM and ROM. As you jam more hardware like sound cards into your system, more of these resources are taken up, increasing the likelihood of a conflict. (See "How an Interrupt Conflict Occurs" on page 182.)

The exception to this rule, of course, is when two devices are never used at the same time, such as an internal fax board and an external modem both assigned to base address 02F8, using COM 2. Because they share a single phone line, it's physically impossible for both devices to dial out or receive a call at the same time.

Knowing which hardware devices are using these resources is the key to a successful adapter installation—if you don't keep tabs on your system configuration, you are bound to experience an interrupt or device conflict. A written inventory of your system gives you a quick reference guide that can help you avoid conflicts *before* they happen. We've provided a form on page 188 where you can itemize what's installed in each slot.

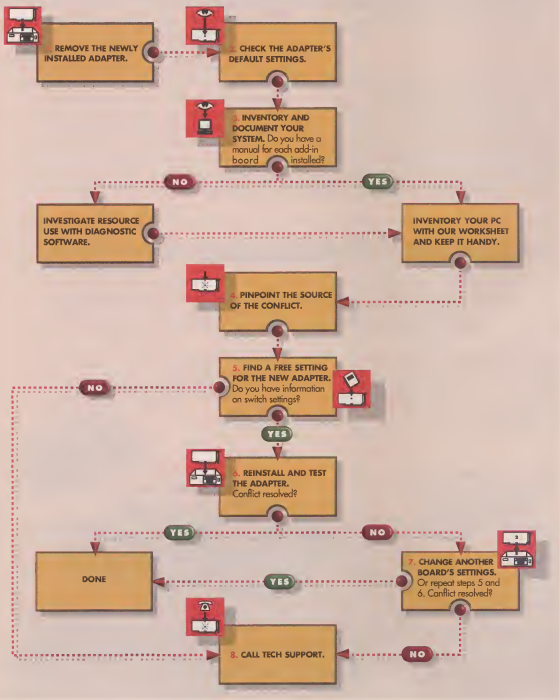
We'll also tell you how to peacefully resolve device or adapter conflicts, organizing this haphazard, hit-and-miss procedure into a simple eight-step process. As a starting point, we assume that you've just installed a new adapter or device in your system, and you're noticing symptoms of a conflict.

We've Got Answers.

TROUBLESHOOT DEVICE DISCORD

Knowing which card is using what resource is the key.

Jam more hardware into your system, and you increase the likelihood of a conflict. Use our easy eight-step process to cure hardware headaches and prevent them from recurring.



1 REMOVE THE NEW DEVICE OR BOARD

Before you do anything, remove the adapter or device you just installed and restore the system so that it's configured as it was before.

In order to properly debug the adapter installation, you must restore your system to the condition it was in prior to attempting the installation of the new adapter. This gives you a ground base from which to isolate and resolve your conflict. After removing the offending adapter, be certain that any changes you made—such as disconnecting cables to adapters already installed to give yourself room for installing the new adapter—are reversed. If you haven't reconnected any cables you moved around, your system may not boot properly.

2 VERIFY DEFAULT SETTINGS

Check that the jumpers, switches, and other settings on the newly installed adapter are correct by consulting hardware documentation.

Errors frequently creep into manuals, so be *absolutely* certain. Manufacturers often print default jumper and/or switch settings in the manual but fail to actually set the adapter to match those defaults. Or the manufacturer may have made an engineering change to the adapter but not included the correct version of the manual in the box. Rather than rely on manuals, double-check the default configuration in our "Default Settings for Popular Peripherals" chart, which starts on page 194, or call the manufacturer for this information. If the settings on the adapter don't match what is printed in the manual, restore the adapter to the factory defaults before proceeding with the next step.

3 INVENTORY YOUR SYSTEM

If you haven't yet recorded what's already installed in your system, do so now. The information this document will provide for you—now and later—can mean the difference between a 15-minute install and a 10-hour install.

Without an accurate floorplan of the system in its present state, you have no way of knowing what IRQs and base addresses are being used by the adapters already in your system. Documenting your system is painless if you have the manuals that accompanied your adapters.

Using the form on page 183, write down the name of the device in the row where its IRQ is listed, and fill in the base address the adapter uses. Then, open your system and identify each adapter by slot number. Record

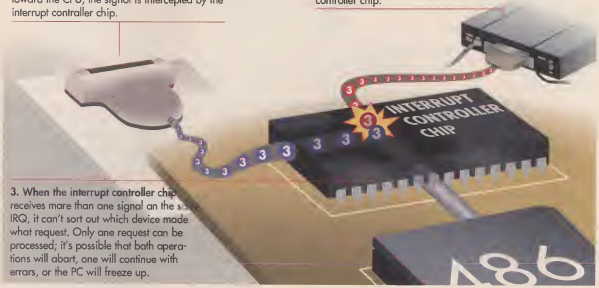
HOW AN INTERRUPT CONFLICT OCCURS

PC frozen? Programs misbehaving? Here's what might have gone wrong.

Each piece of hardware has an IRQ numbered 0 through 15 (0 through 7 on XT and earlier systems). When the hardware needs attention from the CPU, it sends an interrupt request through the interrupt controller chip. Requests from IRQ level 0 are given the highest priority. Below, a fax modem is hooked up to COM2, which most often uses IRQ 3, and a hand scanner is plugged into COM4, which, unbeknownst to the user, also uses IRQ 3.

1. The hand scanner is scanning a text document. To do this, it sends an electrical signal through the interrupt request line, a trace or narrow copper path printed on the circuit board. On its way toward the CPU, the signal is intercepted by the interrupt controller chip.

2. The modem, at the same moment, receives an incoming call and, like the scanner, sends an interrupt service request to the CPU via the interrupt controller chip.



3. When the interrupt controller chip receives more than one signal on the same IRQ, it can't sort out which device made what request. Only one request can be processed; it's possible that both operations will abort, one will continue with errors, or the PC will freeze up.

INVENTORY YOUR SYSTEM

Arm yourself with these details before you begin your next install.

For each interrupt request line numbered 0 through 15, fill in the name and make of the device or adapter using that IRQ, what I/O address the card occupies, and the slot number and DMA channel in use. We've filled out a sample row for our fax board.

IRQ	TYPICAL BASE ADDRESS	INTERNAL DEVICE	DEVICE OR ADAPTER INSTALLED	BASE ADDRESS USED BY DEVICE	SLOT NUMBER	DMA CHANNEL	TYPICAL DEVICE USING INTERRUPT
XT AND AT SYSTEMS							
4	02FB	COM3	xyz fax board	0330	SLOT3	DMA1	
NMI		NMI parity check					
0	0008	CMOS clock (Timer interrupt)					
1	0009	Keyboard					
2	000A	Interrupt controller (Cascade to IRQ9)					Network adapter, scanner, mouse
3	02F8 or 02E8	COM2 or COM4					Mouse, fax modem, network adapter, scanner, tape drive, video
4	03F8 or 02F8	COM1 or COM3					Mouse, fax modem, CD-ROM, scanner
5	0278	LPT2 or hard disk					Sound card, mouse, fax modem, scanner, tape drive
6	03SF0-03F7	Floppy disk controller					Tape drive
7	0278-027F	LPT1					Network adapter, scanner, mouse, sound card
AT SYSTEMS							
8	0070	Real-time clock					
9	0071	Cascade interrupt to IRQ2					SCSI adapter, scanner
10	0072	Available					Network adaptor, SCSI adapter, mouse, sound card
11	0073	Available					Mouse, scanner, sound card, tape drive
12	0074	Available					SCSI adapter, mouse, scanner, video
13	0075	Math coprocessor					Mouse
14		Hard disk controller					SCSI adapter, IDE adapter
15		Available					SCSI adapter, mouse

DMA CHANNEL AND UMB SEGMENT USAGE

Make sure the DMA channel and the memory requirements of the card you're installing don't conflict with the default settings listed here.

DMA CHNL	BUS TYPE	DEFAULT USE
0	8-bit	Available
1	8-bit	Available
2	8-bit	Floppy disk controller
3	8-bit	Available
4	16-bit	DMA controller link
5	16-bit	Hard disk controller
6	16-bit	Available
7	16-bit	Available

UMB SEGMENT	ADDRESS
Interrupt vector table and DOS BIOS low memory tables	0000–0FFF
640K conventional (user) RAM	1000–9000
Disk controller COMMAND.COM, video RAM	A000
Video RAM	B000
EGA and VGA ROM BIOS	C000–C7FF
Hard disk ROM BIOS	C800–CFFF
SCSI adapters, Network adapters	D000–DFFF
Expanded memory page frame, ROM BIOS on PS/2s (thru FFFF)	E000–EFFF
System ROM BIOS	F000–F3FF
BASIC, older systems ROM BIOS	F400–FFFF

Kowabunga! It's as if the Gulf Stream combined with the Jet Stream and suddenly, the waves were breaking like the monsters on the Kona Coast. Just for you. And you never even had to leave your office.
So if your concept of value includes "doing without," look into Digital's new family of PCs for a radical paradigm shift. Every DECpc is packed with features you'd expect in machines costing much more.
The DECpcs are an awesome ride. Buy them for speed. Buy them for expandability. Or buy them because they're the ultimate in value.
intel inside
imagine a family of PCs that turns your idea of

THE DECpc™ FAMILY. ONE BREATHTAKING VALUE AFTER ANOTHER.

	PROCESSOR/PRICE	PACKAGE INCLUDES:
LP SYSTEMS	Low-profile, high performance desktop PCs with built-in local-bus video and GUI acceleration.	
	• 25MHz i486SX $1,549 • 33MHz i486SX $1,749 • 33MHz i486DX $1,999 • 50MHz i486DX2 $2,149 • 66MHz i486DX2 $2,449 • Lease for as low as $54/Month	• Local bus SVGA video • GUI accelerator • 4MB RAM • 128 KB cache • 512 KB video RAM • 127 MB hard drive • 3 ISA slots • 4 drive bays • OverDrive™ Processor Upgrade • 3.5" floppy drive • 14" VGA color monitor • Pre-installed MS-DOS®/ Windows™ • Mouse • 101-key keyboard
MT SYSTEMS	Compact desktop servers with built-in Windows acceleration and plenty of room for expansion and storage.	
	• 33MHz i486DX $2,249 • 50MHz i486DX2 $2,399 • 66MHz i486DX2 $2,699 • Lease for as low as $79/Month	• Local bus SVGA video • GUI accelerator • 4MB RAM • 128 KB coche • 512 KB video RAM • 127 MB hard drive • 6 ISA slots • 5 drive bays • OverDrive Processor Upgrode • 3.5" floppy drive • 14" VGA color monitor • Pre-installed MS-DOS/ Windows • Mouse • 101-key keyboard
MTE SYSTEMS	The only desktop PC you can get with both EISA and VESA-VL buses.	
	• 33MHz i486DX $2,949 • 66MHz i486DX2 $3,399 • Lease for as low as $103/Month	• 6 EISA slots with 1 VESA-VL • Local bus SVGA video • GUI accelerator • 8MB RAM • 128 KB coche • 1MB video RAM • 245 MB hard drive • 5 drive boys • Pentium™ OverDrive Processor Upgrade • 3.5" floppy drive • 14" VGA color monitor • Video adapter • Pre-installed MS-DOS/ Windows • Mouse • 101-key keyboord
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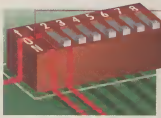
PUTTING IMAGINATION TO WORK

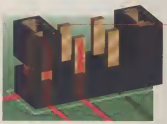
THROWING THE SWITCH

Reset a card's jumpers and switches to a free setting.

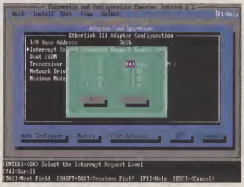
When you find an IRQ, base address, and/or DMA channel that's not in use, set the jumpers or switches on the card you're installing to the free setting. You may also need to edit any startup program that needs to be aware of the new configuration.



Dip switches have one or more switches that are on in one toggled position and off in another. The setting you change rocks to one side or the other to enable or disable a setting.



Jumpers consist of a jumper-sharing block—a small black piece of plastic with gold contacts—that encloses two pins. To enable a specific setting on an adapter, place a jumper over two pins.



Use configuration software for a program that performs erratically when it accesses the card you just installed. 3Com's software ensures that the adapter is configured for the correct base address and IRQ.

the slot number on the form, along with any DMA channel in use. You may have to physically remove the adapter to glean the settings. If you do so, be sure to ground yourself properly beforehand. Reinsert each adapter after you've documented it and before you move to the next adapter, carefully ensuring that the card edge connectors are firmly and squarely seated on the motherboard. Check and doublecheck this point; you want your computer to work again when you're through. If your PC has no documentation, try using DOS's MEM command or Microsoft Diagnostic software (MSD) to diagnose its setup (see "Windows into Your Hardware" on page 189).

If MSD or MEM /D or other suitable diagnostic utilities aren't enough to help, jump ahead to step 8 now. Contact the manufacturer of the adapter you are trying to install and seek the technical department's help in properly configuring your adapter.

4 PINPOINT THE CONFLICT'S SOURCE

Use the information you gathered in the tear-off form to compare the settings an the new adapter to those already in use an your system.

If your system inventory is complete, you should be able to review the data on your form and compare the settings for the adapter you are trying to install to help pinpoint the conflict easily. Usually. After installing an Intel CCP fax adapter in my own system, I was unable to use the fax board and my hand scanner. After reviewing my own inventory chart, I saw that the scanner was also using DMA channel 1, a conflict I could have avoided had I reviewed the chart prior to installing the fax adapter.

Again, diagnostic programs can help you identify conflicting base addresses and IRQs.

5 FIND A FREE SETTING; RESET SWITCHES

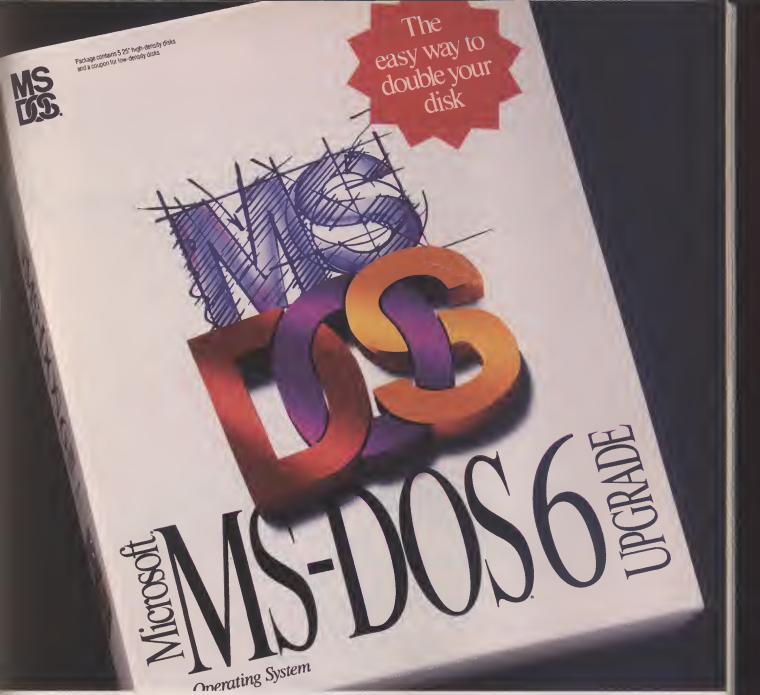
Set the new adapter's jumpers and switches to an available IRQ, base address, and/or DMA channel to avoid another conflict.

Fortunately, my fax adapter's manual pointed me to the proper jumper and switch settings—I needed to change the DMA channel to 3 from the default of channel 1. Using my needle-nose pliers, I moved the jumper shorting block on the fax adapter to the proper setting for DMA channel 3 and changed switch 2 on the switch bank with a pencil from on to off. (See the illustrations of common jumpers and switches above.)

If you reassign the IRQ on a card, some cards require that you also change the software configuration, which may involve altering command line parameters or settings in CONFIG.SYS or, in Windows, your SYSTEM.INI file. This is particularly true with sound cards. Programs that use sound cards must be made aware of changes to the default settings. If you run a program that freezes up or performs erratically when it accesses the sound card, make sure that the program is configured for the correct base address and IRQ.

If your adapter has no jumper and switch settings to change and you cannot locate the manual for the adapter, contact the manufacturer of the adapter.

If the settings on the board are hardcoded (as they are on some older boards), you'll have to consider changing the settings on a different adapter or device. See step 7.



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WINDOWS INTO YOUR HARDWARE

Use DOS's MEM command or Microsoft's Diagnostic software to hunt for conflicts.

If yau have na documentation available, try peering inta your system with DOS's MEM cammand with the /D (DEBUG) switch, ar Micrasaft's Diagnastic saftware, which accampanies Windaws 3.x and DOS 6.0. Typing MEM /D at a DOS prampt praduces a lang repart that scralls by quickly. Yau can view it ane screen at a time by typing MEM /D | MORE. The repart includes a memary summary shawing canventianal memary, upper memary black, adapter RAM/ROM (shawing yau that adapter memary is using pieces af the UMB), and extended memary tatals. Mare information appears in the table belaw detailing canventianal memary. This table shaws the details abaut interrupts and base addresses for camman devices.

The first item listed is the interrupt vectar table, which is the table af cantents DOS uses ta lacate devices and drivers that use specific interrupts, in the same way that the file allocatian table (FAT) keeps track af where pragrams and files are lacated an a hard disk. MEM then pravides a current I/O table shawing the drivers being laaded in CONFIG.SYS, such as MSCD000 far a CD-ROM drive, CONNECT far a fax baard, and HPSCAN far a scanner. This data is just a clue ta what's inside my system. It shaws that adapters with RAM ar ROM are physically present and using UMB space, and that I need to be cancerned about this area when installing a new adapter.

MSD pravides mare detail, particularly far IRQs. A full IRQ status report makes it is easy to spot basic interrupt use, alang with a descriptian af the device and basic infarmatian abaut the saftware cantrallng each interrupt.

As yau can see belaw, the InPart Mause, currently using IRQ2, is using the secand (ar cascade) interrupt cantraller while COM1, the serial part, is using IRQ4. The Address calumn shaws the UMB address allacated ta whatever device is listed in the Descriptian calumn. The Handled By calumn indicates what saftware is cantralling the interrupt in questian—the system BIOS ar adapter memary. Far IRQs 0 and 2, MSD reparts an Unknawn. This indicates that MSD is uncertain whether the device is internal (handled by BIOS) ar external (adapter-based).

Twa ather useful tables in the MSD repart list infarmatian abaut serial and parallel parts. With infarmatian like that pravided by this utility and that fram the MEM /D cammand, you can find aut mare about what's inside yaur system withaut having ta pap the haad. Third-party saftware can be even mare helpful in identifying IRQs and base addresses.

Sample Listing Using DOS MEM Command

Segment	Total	Name	Type
00000	1039 (1K)		Interrupt Vector
00040	271 (0K)		ROM Communication Area
.....			
.....			
.....			
0025B	9776 (10K)	IO	System Data
	3088 (3K)	EMMXXXX0	Installed Device=QEMM386
	272 (0K)	SETVERXX	Installed Device=SETVER
	1232 (1K)	E:	Installed Device=RAMDRIVE
	256 (0K)	MSCD000	Installed Device=LOADHI
	256 (0K)	CONNECT$	Installed Device=LOADHI
	256 (0K)	HPSCAN	Installed Device=LOADHI
.....			
.....			
.....			
00592	5600 (5K)	CASMGR	Program
.....			
.....			
.....			

Sample Listing Using MSD Utility

		IRQ Status		
IRQ	Address	Description	Detected	Handled By
0	CA09:00D2	Timer Click	Yes	Unknown
1	F000:E987	Keyboard	Yes	BIOS
2	CA09:02CD	Second 8259A	Yes	Unknown
			InPort Mouse	
3	F000:EA97	COM2: COM4:	No	BIOS
4	F000:EA97	COM1: COM3:	COM1:	BIOS
5	F000:EA97	LPT2:	No	BIOS
6	F000:EF57	Floppy Disk	Yes	BIOS
7	0070:06F4	LPT1:	Yes	System Area
8	F000:EA42	Real-Time Clock	Yes	BIOS
9	F000:EECF	Redirected IRQ2	Yes	BIOS
10	F000:EA97	(Reserved)		BIOS
11	F000:EA97	(Reserved)		BIOS
12	F000:EA97	(Reserved)		BIOS
13	F000:EED8	Math Coprocessor	Yes	BIOS
14	F000:E845	Fixed Disk	Yes	BIOS
15	F000:8FB8	(Reserved)		BIOS

If your system is so crowded that there are no open interrupts, you will have to have two devices share an interrupt, which means you won't be able to use them simultaneously.

6 REINSTALL AND TEST ADAPTER

Now, using the settings you've identified as available, reinstall your new adapter, and determine if you've resolved the problem.

Be sure to give the reinstalled adapter a thorough workout before declaring the conflict resolved. If you still have problems, go back over your system map and the settings for the adapter once more and, again, reinstall. If this doesn't work, it's time to attack the problem from a different front.

7 IF YOU FAIL, PULL ANOTHER BOARD

If you still encounter device conflicts after numerous attempts to set the new adapter to an address setting that appears to be available, then it's time to take a look at changing another adapter's settings instead.

The first adapter to consider changing is the one your new adapter is conflicting with. In my earlier example, the conflict was between the fax adapter and the scanner's controller, both of which were trying to use DMA channel 1. The scanner documentation provided the proper jumper settings on the controller for both DMA channel 1 and DMA channel 3. By changing the DMA channel on the scanner controller to DMA channel 3, I was able to install the fax adapter with its factory-default setting of DMA channel 1, avoiding the conflict entirely.

If I had not been able to change the DMA channel on the scanner controller, I would have gone back to my chart and determined which other adapters that were already installed used DMA channels. I would have then reviewed the manuals for those adapters to determine if one of the DMA channels could be changed to a nonconflicting channel so that the fax adapter could be installed.

If there are no other adapters with changeable DMA channels available, your only choice is to restore your system to its default condition prior to attempting the installation and then contact the manufacturer of the new adapter for guidance.

The bottom line? It doesn't make a whole lot of sense to start flipping adapters in and out of the system. Try two adapter changes. After that, it makes more sense, and it costs a lot less in the long run, simply to contact the manufacturer for assistance or replacement.

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8 STILL IN CONFLICT? CALL SUPPORT

You've done everything we've recommended, and you still can't seem to get this conflict resolved. Be aware your problem may be entirely software related—and that's something that the technical support folks at the manufacturer's facility might be able to tell you right off.

It's time to contact technical support about the originally installed-and-failed adapter, and there are some things you need to have handy before you call. First, restore your system to its original configuration. Print out your CONFIG.SYS and AUTOEXEC.BAT files, and run a full diagnostic report. Make sure you have the model and serial numbers handy (they should be silkscreened on the adapter, or they might be printed in the manual) and that the adapter has been restored to the same jumper and/or switch settings that were set when you removed the adapter from its packaging. This preparation will allow the tech support staffer to get a handle on your problem quickly and save you time (and money) on the phone.

If you cannot locate a board's vendor or the vendor has gone out of business, don't despair. Several resources are available that may bring relief. The Federal Communications Commission has a bulletin board service that can help you track down the OEM manufacturer. The FCC bulletin board is called FCC Public Access Link and can be reached at (301) 725-1072. Access is free. CompuServe Information Services (800-848-8990) is another on-line gold mine of information. Many of the hardware-specific forums can provide details about the adapter you are trying to install. ZiffNet, hosted by CompuServe, sponsors the Ziff-Davis publication forums and is a good way to get information from industry insiders. CompuServe members just type GO PCCONTACT at any forum prompt.

On CD-ROM and in print are some excellent sources of information on hardware products. Micro House International (4900 Pearl East Circle, Suite 101, Boulder, CO 80301; 800-926-8299; 303-443-3388) publishes an encyclopedia of configuration information (on CD-ROM or in book form) on hard drives, hard and floppy drive controllers, and network interface cards. Ziff-Davis's Computer Select (800-827-7889, 212-503-4400) is a CD-ROM-based subscription, which includes full text and abstracts of over 140 major computer and trade publications, as well as specs on hardware and software products.

Sally Neuman is a systems integrator in Longview, Washington, and a sysop on PC/Contact. Her book Easy Upgrading and Troubleshooting *is available from Prentice Hall.*

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DEFAULT SETTINGS FOR POPULAR PERIPHERALS

Save time and avoid hassles by identifying your system settings.

Find the name of the adapter or device that you've installed or are thinking of installing at left and read across for default and alternative IRQ, base address, and DMA channel settings. If your device is not covered here, it may be configured similarly to one in its category, so you can at least get a feel for the potential pitfalls.

DEVICE OR BOARD	DEFAULT IRQ	ALTERNATE IRQ	DEFAULT BASE ADDRESS	ALTERNATE BASE ADDRESSES	DMA CHANNEL (ALTERNATE)	POTENTIAL DEVICE CONFLICTS	TECHNICAL SUPPORT
CD-ROM Drives							
NEC CDR-74	N/A	N/A	CC00	C800, DC00, D800	1 [3]	HD, NET, SCSI	(800) 338-8888, (508) 635-4000
Toshiba XM-3301	4 [1]	3	CA00	C800, CE00, DE00	1 [3]	COM3-4, HD, LPT2, NET, SCSI	(714) 455-0407
Sony CDU-6100, 6101, 6110, 6111, 6211, 7205, 7211 [1]	N/A	2,3,4,5	0340	0300 through 03F0	1 [3]	8, COM1–2	(800) 326-9551, (408) 894-0555
Sony CDU-541 [1]	5 [1]	3	CA00	C800, CE00, DE00	N/A	8, COM1–2	(800) 326-9551, (408) 894-0555
Sony CDU-510 [1]	4 [1,3]	N/A	0340	0300 through 03F0	1	8, COM1–2	(800) 326-9551, (408) 894-0555
(1) DOS software doesn't use an interrupt for CD-ROM drives. (2) Interrupt setting is not required on AT and higher systems. Leaving interrupt settings at 4 will not interfere with other devices. (3) XT-class PCs require setting of DMA 1.							
Hard Drive/Floppy Drive Adapters							
Adaptec 1570, 1572	11	9,10,12	C800	C000,0800,DC00 (1)	0	NET	(800) 959-7274, (408) 945-2550
Adaptec 1540B, 1542B	11	9,10,12,14,15	DC00	CC00,C800,0800	5	NET	(800) 959-7274, (408) 945-2550
Adaptec 1540C, 1542C	11	9,10,12,14	0C00	C800,C00,0000,0400, 0800,0C00	5	NET	(800) 959-7274, (408) 945-2550
Boca IDE Plus	7,4,3	2,5	N/A	N/A	N/A	COM1–2, NET, TBD,	(407) 241-8088
CTX or Clone IDE/FD (Model UN-1072)	7,4,3	2,5	N/A	N/A	N/A	COM1–2, NET, TBD,	N/A
OPTi SmartCache Plus SR2011/90	14	12,15	C800	0800,DC00	5	NET, TBD	(407) 830-5522
OPTi SmartCache Plus SR2012/8	N/A	N/A	C800	0800	N/A	NET, TBD	(407) 830-5522
Western Digital WD1003 ST506 412	6	N/A	N/A	N/A	2	N/A	(714) 932-5000
Western Digital WD1006M ST506 412	6	N/A	N/A	N/A	2	N/A	(714) 932-5000
Western Digital WD1006V ST506 412	6	N/A	C00	N/A	2	N/A	(714) 932-5000
UltraStor Ultra15C Caching IDE	14	15	0800	C800,C000,0000,0400,DC00	N/A	NET, TBD, V	(510) 623-8955
I/O Cards							
Boca I/O 2 by 4, IOAT41, IOAT42	7, 4, 3	2, 5	037B, 03F8, 02F8	027B, 03E8, 02E8	N/A	COM3–4, LPT2, RTC	(407) 241-8088
Boca I/O AT44	7,5,4,3	2	037B, 027B, 03E8, 02E8	03E8, 02E8	N/A	COM3–4, RTC	(407) 241-8088
Everex Magic I/O (EV170 and EV170a)	5, 4, 3	2	037B, 03F8, 02F8	03BC, 027B	N/A	COM3–4, LPT1, RTC	N/A
Modular Circuit Technology (JDR) MCT-AIO, MCT-AIO+	7,5,4,3	2	037B, 027B, 03F8, 02F8	03BC, 027B	N/A	COM3–4, RTC	(408) 559-1200
Mice							
Logitech Serial	4 (COM1, COM3)	3 (COM 2, COM 4)	03F8 (COM1)	02F8 (COM 2), 03E8 (COM3), 02E8 (COM4)	N/A	M, SP (COM3–4 where supported)	(510) 795-8100, (415) 795-0417
Logitech Bus	2	3,4,5	023C	0238	N/A	HD, LPT2, M, NET, SP, Video	(510) 795-8100, (415) 795-0417
Microsoft Serial	4 (COM1, COM3)	3 (COM 2, COM 4)	03F8 (COM1)	02F8 (COM 2), 03E8 (COM3), 02E8 (COM4)	N/A	M, SP (COM3–4 where supported)	(206) 637-7096
Microsoft Bus	2	3,4,5	023C	0238	N/A	LPT2, M, SP	(206) 637-7096
Mouse Systems Serial Card	4 (COM1, COM3)	3 (COM 2, COM 4)	03F8 (COM1)	02F8 (COM 2), 03E8 (COM3), 02E8 (COM4)	N/A	M, SP (COM3–4 where supported)	(510) 656-1117
Modems (continued on page 196)							
USRobotics Sportster 14,400/PC and 14,400/PC F [1]	3 (COM2)	4, 5,7	02F8	03F8, 03E8,02E8	N/A	SERIAL	(800) 982-5151, (708) 982-5151
USRobotics Courier/PC and Courier/PC F (HST, V.32) [1]	3 (COM2)	4,5,7	02F8	03F8, 03F8,02E8	N/A	SERIAL	(800) 982-5151, (708) 982-5151
Practical Peripherals 2400EFX	4 (COM1)	3	03F8	02F8,03E8,02E8	N/A	SERIAL	(805) 496-7707
Practical Peripherals 9600FX	4 (COM1)	3	03F8	02F8,03E8,02E8	N/A	SERIAL	(805) 496-7707
Practical Peripherals 14400FXSA	N/A	N/A	N/A	N/A	N/A	SERIAL	(805) 496-7707
Intel SatisFaxion M [2,3]	Software setup	2,3,4,5	N/A	03F8,02F8,03E8,02E8	1 or 3 (fax option)	SERIAL, V	(503) 629-7000
Intel Connection CoProcessor Fax	Software setup	N/A	N/A	02A0,03A8,0330,0340	1 or 3	HD, SCAN, SERIAL, V	(503) 629-7000

N/A=Not applicable, which means that the device is either external or doesn't use that resource. In columns labeled alternate settings, where the device listed has a default setting, N/A means that no alternate setting is available.

Legend for Potential Device Conflicts

B=Bus devices EMS=EMS boards FAX=Fax boards F/M=Fax modem HD=Hard drive M=Modem MC=Math coprocessor NET=Network adapter RTC=Real time clock S=Sound cards SCSI=SCSI devices SCAN=Scanner SERIAL=Serial port devices SP=Serial printer TBD=Tape backup drive V=Video card

Even a *free* memory manager may not be a bargain—especially if it can't give you all the memory you need.

Introducing QEMM 7 The Memory Manager Worth Paying For

The newest version of QEMM, version 7, pioneers new ways of using the critical area between 640K and 1024K. It optimizes this area, taking into account the many drivers that need more memory at start-up than when running; instantly calculating millions of possible memory configurations to find still more memory for your applications, TSRs and utilities to use.

Instant Riches

What does more memory mean in a practical sense? Simply that your DOS and MS Windows programs run faster, smoother and more reliably. It means you can continue to add valuable utilities, drivers, TSRs and new capabilities to your PC. Whether it's workhorse drivers like LAN utilities and fax drivers; productivity-enhancers like disk caches and disk compressors; or fun and exciting capabilities like sound boards, CD ROM drivers, graphics tablets, etc. The better your memory is managed, the more versatility and flexibility your PC will have. QEMM 7 lets you have it all without fear of 'out of memory' messages or crashes.

DOS 6 Giveth; DOS 6 Taketh Away

The best feature of new DOS 6 is the stable of utilities it includes. Trouble is, they all eat up memory. DoubleSpace file compression needs 43K, Vsafe anti-virus needs 7-45K, Smartdrv disk cache needs 28K and even Undelete takes 10-14K as a resident program. Using MemMaker, you could easily lose—not gain—available 'conventional' memory in DOS 6.

New QEMM 7 takes the best of the new

How to Look a Gift Horse in the Mouth

We tested DOS 6 with and without MemMaker and with QEMM 6 and our new QEMM 7 runs away from all of them. See details of test conditions listed below.

DOS 6 features into account, finding ways to cut memory demands for these utilities by up to 80%, ensuring that the all-important memory below 640K is free for your programs. And QEMM 7's seemingly small feature of supporting DOS 6's multiple configurations gives you the flexibility and ease of setup that you expect. (MemMaker doesn't work well with this important DOS 6 feature.)

Page Frame: the Key to Your Future

There's been a lot of jealous talk about our patent-pending Stealth technology. Nobody else can duplicate its 48-115K gains.

The key to Stealth is its use of a 64K reserved area above 640K called the page frame. Besides being used by Stealth, the page frame lets Lotus 1-2-3 r2.x run larger spreadsheets and WordPerfect 5.x larger documents. It's also used by DESQview for multitasking, Novell Netware, IBM LAN Server and DECnet for reducing the network driver memory footprint, plus games for fast action. You sacrifice all this when other memory managers turn off the page frame.

Prior versions of QEMM won just about every competition in sight, as well as remaining the #1 best-selling memory manager 5 years straight.

Stealth saves you room to set up your PC with a mouse, CD ROM, sound board, a network such as Novell NetWare, create 8-24K of extra memory for optimal MS Windows performance, use all of DOS 6's memory-hungry utilities and still have more than 630K to run applications smoothly and safely.

Put Your Money on a Winner QEMM 7

The new and ever more exciting capabilities coming to your PC will all compete for memory with your favorite applications, TSRs and drivers. And that makes QEMM 7 the most vital utility you can own.

Our seventh-generation memory manager is a thoroughbred that helps you get the most out of your PC today and tomorrow.

Quarterdeck

Quarterdeck Office Systems, 150 Pico Boulevard, Santa Monica, CA 90405 (310) 392-9851 Fax (310) 314-4219
Quarterdeck International Ltd., B.I.M. House, Crofton Terrace, Dun Laoghaire Co. Dublin, Ireland Tel. (353) (1) 284-1444 Fax: (353) (1) 284-4380

How we got the chart numbers: CPU - 486/33 ALR Power Express VESA machine equipped with 16 megs of RAM and running MS-DOS 6. Comparisons were done using the following memory managers: QEMM 7, QEMM 6.02, MS-DOS 6 MemMaker. In addition to the drivers (or drivers) required by each memory manager, the following drivers, DOS resources and programs were loaded for all components: mouse.com, SETVER.EXE, DOS=HIGH, FILES=25, BUFFERS=15, STACKS=0, WINDOWS SYS, SMARTDRV.SYS, SLCD.SYS, DOS SHELL=command.com, or the AUTOEXEC.BAT file VSAFE, MSCDEX, UNDELETE, LSLCOM, NBDOM.COM, IPXODI.COM, NETX.OR EMNETX, MOUSE.COM, SMARTDRV.COM, PRTNC.AP.COM, ©1991 Quarterdeck Office Systems. Trademarks are property of their respective owners.

Circle 174 on reader service card.

DEVICE OR BOARD	DEFAULT IRQ	ALTERNATE IRQ	DEFAULT BASE ADDRESS	ALTERNATE BASE ADDRESSES	DMA CHANNEL (ALTERNATE)	POTENTIAL DEVICE CONFLICTS	TECHNICAL SUPPORT
Modems (continued from page 194)							
Hayes Smartmodem 2400B	4 (COM1)	3(COM2)	03F8	02F8	N/A	SERIAL	(404) 441-1617
Hayes JT Fax 9600B	N/A	N/A	N/A	CC00-CF80	N/A	HD, SCAN, SERIAL, V	(404) 441-1617
Hayes Smartmodem Optima (24, 96, 144)	4 (COM1)	3 (COM2)	03F8	02F8	N/A	SERIAL	(404) 441-1617
SupraFaxModem	Software setup	2,3,4,5	N/A	03F8,02F8,0388,02E8	N/A	SERIAL, V	(503) 967-2440
Complete Modem Plus, Complete Modem Plus External	3 (COM2)	4	02E8	03F8,02F8,03E8	N/A	SERIAL	(408) 434-9600

(1) Modems comes with recommended switch settings for a variety of communications software. (2) Intel's TESTCOM automates the configuration process for COM port and IRQ. (3) Intel SatisFAXtion uses DMA channel 1 or 3 when the fax option is installed.

Network Adapters							
Hercules Network Card Plus	2	2,3,5	03F8	0310,0390,03E8	3 (1,2)	COM2/4, LPT2, 5, SCSI, SCAN, TBD	(510) 623-6030
Artisoft ArcStar	3	N/A	02B0	02D0-02E0	N/A	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(510) 623-6030
Artisoft AE-2 Ethernet	3	2,4-7,10,15	0300	0320,0340,0360	Disabled (1,3,5,7)	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(510) 623-6030
Madge Smart 16/4 AT Ringnode	3	2-3,5,7,9-12,15	0A20	1A20,2A20,3A20	5 (1,2,4-6)	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(800) 876-2343,
Madge Smart 16/4 MC Ringnode	Software setup	Software setup	Software setup	Software setup	Software setup	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(408) 955-0700
SMC/Western Digital Ethernet/10BASE-T	3	2,4-5,7,10-12,15	0280	0320	N/A	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(714) 707-2200
Eagle Technology NE1000	3	2-5	0300	0320-0360	N/A	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(408) 745-0700,
Eagle Technology NE2000	3	2,4,5	0300	0320-0360	N/A	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(800) 726-5267
Eagle Technology NE3200	3	4-5,9-11	3000	4000-9000, D000	N/A	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(800) 726-5267
Intel EtherExpress 16 and 16TP (old models)	3	2,4-5,9-11	0300	0310-0370	N/A	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(503) 629-7000
Intel EtherExpress 16, 16TP, and 16C	3	2,4-5,9-11	0300	0310-0370	N/A	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(503) 629-7000
Proteon ProNet-4/16	3	2,4-5,9-11	0300	0310-0370	N/A	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(508) 898-3100
Thomas Conrad TC5045 Ethernet/AT[1]	3	2,5,7,9-12,15	0300	0100-01A0,0320-0340	5 (1,6,7)	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(800) 332-3683
Thomas Conrad TC5143 Ethernet/AT[1]	3	2,5,7,9-12,15	0300	0100-01A0,0320-0340	5 (1,6,7)	COM1/3, COM2/4, LPT1-2, 5, SCSI, SCAN, TBD	(512) 836-1935

(1) Setup software can help outmanage the jumper settings before the adapter has been installed.

RAM Cards							
BocaRAM 8 bit[1]	D000[4]	E000[4]	0268	0208,0218,0258	N/A	NET, V	(407) 241-8088
BocaRAM AT[1]	D000[4]	A000[4]	0268	0208,0218,0258	N/A	NET, V	(407) 241-8088
BocaRAM/AT Plus (SIMM) version[3]	N/A	N/A	N/A	N/A	N/A	NET, V	(407) 241-8088
BocaRAM/AT Plus (VRAM) version[3]	N/A	N/A	N/A	N/A	N/A	NET, V	(407) 241-8088
Orchid RamBoard 8/16	N/A	N/A	N/A	0208,0300,0308, 0310,0600,0608	N/A	NET, V	(510) 683-0323
Intel AboveBoard[3]	D000[4]	C000[4]	0370	0270,0350	N/A	HD, NET, V	(503) 629-7354

(1) Includes software LIM EMS 4.0 emulator driver. (2) Boca recommends removing network adapter while configuring AT Plus card to avoid conflict at address 0300. (3) The AboveBoard, set at A000 for the page frame in an IBM AT, can damage either the AboveBoard or the AT motherboard. (4) Memory adapters don't use IRQs but take up an address in the expanded memory page frame if configured to use expanded memory.

Scanners							
ScanPlus Plusink	N/A	N/A	0270	0220-0370	1 or 3	COM1-2, HD, LPT1-2, NET, S	(408) 980-1234
The Complete Page Scanner	2	3, 4, or 5	0389	0220-0380	1 or 3	COM1-2, HD, LPT1-2, NET, S	(408) 434-9600
The Complete Half-Page Scanner	2	3, 4, or 5	0389	0220-0380	1 or 3	COM1-2, HD, LPT1-2, NET, S	(408) 434-9600
Logitech ScanMan 32, Logitech ScanMan 256	3[1]	2,4,5,7,9,11-12	0280	02A0, 03BC, 0340	1 or 3[1]	COM1-2, HD, LPT1-2, NET, S	(510) 795-8100
Logitech ScanMan Color	2[1]	2,4,5,7,9,11-12	0280	02A0, 03BC, 0340	1 or 3[1]	COM1-2, HD, LPT1-2, NET, S	(510) 795-8100
Hewlett-Packard ScanJet IIc	Software setup	Software setup	Software setup	C800-E400	Software setup	EMS Page Frame, HD, NET, S	(208) 323-2551
Intel Hand Scanner (SatisFaxtion)	2	3-5,7,10-11	0300	0220-0380	1 or 3	COM1-2, HD, LPT1-2, NET, S, TBD	(503) 629-7354

(1) Older ScanMan controllers require hardware jumpers for IRQ and DMA channel. Newer controllers select the IRQ and DMA channel on the device's command line in CONFIG.SYS.

Sound Boards							
Media Vision Pro AudioSpectrum 16[1,2,3,4,5,6]	7	2-4,6,10-12, 15	0220	0230, 0240	3 (0-2,5-7)	COM1-2, LPT1-2, NET, SCSI, SCAN, TBD	(800) 638-2807, (510) 770-9905
Media Vision Pro AudioSpectrum Plus[1,2,3,4,5,6]	7	2-4,6,10-12, 15	0220	0230, 0240	3 (0-2,5-7)	COM1-2, LPT1-2, NET, SCSI, SCAN, TBD	(800) 638-2807, (510) 770-9905
Microsoft Windows Sound System[7]	11	7, 9-10	0530	0604, 0E80, 0F40	0 (1,3)	Video, HD	(206) 635-7040
Creative Labs' Sound Blaster[8,9,9]	5	2, 3, 7	0220	0240	1 (0,3)	COM1-2, LPT1-2, NET, SCSI, SCAN, TBD	(408) 428-6622
Creative Labs' Sound Blaster Pro[8,9,9]	5	2, 3, 7, 10	0220	0240	1 (0,3)	COM1-2, LPT1-2, NET, SCSI, SCAN, TBD	(408) 428-6622
Creative Labs' Sound Blaster 16 ASP (Audio)[8,9,9]	5	2, 3, 7, 10	0220	0240	1 (0,3)	COM1-2, LPT1-2, NET, SCSI, SCAN, TBD	(408) 428-6622
Creative Labs' Video Blaster[1]	10	5, 11, 12	2A06	2A90, 2AF0	1	COM1-2, LPT1-2, NET, SCSI, SCAN, TBD	(408) 428-6622
Artisoft Lantastic Voice Adapter	Auto-configuring	Auto-configuring	Auto-configuring	Auto-configuring	1	COM1-2, LPT1-2, NET, SCSI, SCAN, TBD	(602) 393-6363

See the CD-ROM section for information about internal and external CD-ROM drives. For sound cards, most DOS-based applications only recognize DMA1 and DMA3, and IRQs 2,3,5, and 7.

(1) Pro AudioSpectrum DMA and IRQ settings can be changed by altering the driver configuration in CONFIG.SYS. The IRQ and base address settings on the SoundBlaster section of the card must be changed by altering jumpers. The SoundBlaster section uses IRQ 5 and address 0220 as defaults. (2) The software to drive the Pro AudioSpectrum products includes an installation utility to check the DMA and IRQ settings. (3) Pro AudioSpectrum supports Chinon, Hitachi, IBM, Laser Magnetic, NEC, Panasonic, Pioneer, Sony, Toshiba, and Toshiba. Other SCSI devices are also supported (such as hard drives, and so on) with an add-on kit. (4) Media Vision provides both internal and external SCSI cable/driver kits for $49 to $79, depending on the CD-ROM drive attached. (5) Microsoft Sound System defaults to DMA channel 0 if board is installed in a 16-bit slot. (6) Multiple Pro AudioSpectrum 16 boards can be installed by changing the board ID at jumper J2. (7) SoundBlaster/SoundBlasterPro boards support only Panasonic/Matsushita CD-ROM drives. (8) Videoblaster can coexist with standard VGA cards through the feature connector. (9) Nearly all SoundBlaster cards shipped before June 1, 1993, were shipped with the default IRQ set at IRQ7, a direct conflict with LPT1.

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Circle 139 on reader service card.

DEVICE OR BOARD	DEFAULT IRQ	ALTERNATE IRQ	DEFAULT BASE ADDRESS	ALTERNATE BASE ADDRESSES	DMA CHANNEL (ALTERNATE)	POTENTIAL DEVICE CONFLICTS	TECHNICAL SUPPORT
Tape Backup Drives							
Mountain FileSafe-4440, ID 230 [1,2,4]	6	N/A	03E7	01E7	2	COM3–4, FAX, HD, LPT1–2, NET, SCAN	(408) 438-4897
Mountain FileSafe 1200	11	12	0D30	0D00,03D7,03B0	5 [1]	COM3–4, FAX, HD, LPT1–2, NET, SCSI, SCAN	(408) 438-4897
Mountain FileSafe 7000/7060/7150/7250	3	N/A	02B8	029C	1	COM3–4, FAX, HD, LPT1–2, NET, SCAN	(408) 438-4897
Mountain FileSafe 8000Plus/7040000, 8SCX0DE	6	N/A	03E7	01E7	2	COM3–4, FAX, HD, LPT1–2, NET, SCAN	(408) 438-4897
Colorado Jumbo 120, Trakker 120 [2,3]	N/A	N/A	N/A	N/A	N/A	COM3–4, FAX, HD, LPT1–2, NET, SCAN	(800) 845-7996, (303) 669-6500
Colorado Jumbo 250, Trakker 250 [2,3]	N/A	N/A	N/A	N/A	N/A	COM3–4, FAX, HD, LPT1–2, NET, SCAN	(800) 845-7996, (303) 669-6500
Colorado PowerTape 4000	N/A	N/A	N/A	N/A	N/A	COM3–4, FAX, HD, LPT1–2, NET, SCSI, SCAN	(800) 845-7996, (303) 669-6500
Maynard MayrinStream 250 Q [1]	3	2,4–7	03D7	0340	1 (2)	COM3–4, FAX, HD, LPT1–2, NET, SCSI, SCAN	(800) 227-6296, (407) 263-3500
Maynard MayrinStream 525 Q [1]	3	2,4–7	03D7	0360	1 (2)	COM3–4, FAX, HD, LPT1–2, NET, SCSI, SCAN	(800) 227-6296, (407) 263-3500
Maynard MayrinStream 1350 Q	3	2,4–7	03D7	0340	1 (2)	COM3–4, FAX, HD, LPT1–2, NET, SCSI, SCAN	(800) 227-6296, (407) 263-3500
Maynard MayrinStream 2000 DAT [1]	3	2,4–7	03D7	0340	1 (2)	COM3–4, FAX, HD, LPT1–2, NET, SCSI, SCAN	(800) 227-6296, (407) 263-3500
Maynard MayrinStream 4000 DAT [1]	3	2,4–7	03D7	0360	1 (2)	COM3–4, FAX, HD, LPT1–2, NET, SCSI, SCAN	(800) 227-6296, (407) 263-3500
Maynard MayrinStream 2200 HS+	3	2,4–7	03D7	0340	1 (2)	COM3–4, FAX, HD, LPT1–2, NET, SCSI, SCAN	(800) 227-6296, (407) 263-3500
Maynard MayrinStream 5000 HS	3	2,4–7	03D7	0340	1 (2)	COM3–4, FAX, HD, LPT1–2, NET, SCSI, SCAN	(800) 227-6296, (407) 263-3500
Maynard Irwin ExPort	6	2–5,7	03D7	0330,03F0,0360	2 (1,4)	COM3–4, FAX, HD, LPT1–2, NET, SCSI, SCAN	(800) 227-6296, (407) 263-3500
Maynard AccuTrak (AX20K), AccuTrak Plus (AX25DE)	N/A	N/A	N/A	N/A	N/A	COM3–4, FAX, HD, LPT1–2, NET, SCAN	(800) 227-6296, (407) 263-3500
Maynard Archive XL (5525DX), 5250, 1350Q, 2000, 4000) [1,3]	3	2,4–7	03D7	0360	1 (2)	COM3–4, FAX, HD, LPT1–2, NET, SCAN	(800) 227-6296, (407) 263-3500
Iomega Bernoulli [1]	5	7	0340	0350-0368	3 (1)	COM3–4, FAX, HD, LPT1–2, NET, SCAN	(801) 778-3000
Video*							
Orchid Fahrenheit [1]	12	9–11 [3]	0344 [3]	0354	N/A	EMS, FAX, HD, NET, SCAN	(510) 683-0323
Orchid Fahrenheit 1280P, 1280P/3 [1]	N/A	9	0350 [1]	N/A	N/A	COM3–4, EMS, FAX, HD, NET, SCAN	(510) 683-0323
Orchid ProDesigner II	N/A	2	N/A	N/A	N/A	EMS, FAX, HD, NET, SCAN	(510) 683-0323
Orchid ProDesignerIIs	N/A	2	N/A	N/A	N/A	EMS, FAX, HD, NET, SCAN	(510) 683-0323
ATI Graphics Ultra, UltraPro, UltraPlus, Graphics Vantage	N/A	2,3,5	02E0 [1]	02EC, 02E8 (Bus mouse)	N/A	COM3–4, EMS, FAX, HD, NET, SCAN	(416) 756-0711
ATI VGA Wonder XL	N/A	2,3,5	N/A	02EC, 02E8 (Bus mouse)	N/A	COM3–4, EMS, FAX, HD, NET, SCAN	(416) 756-0711
ATI 8514/Ultra [1]	N/A	2,3,5	N/A	N/A	N/A	COM3–4, EMS, FAX, HD, NET, SCAN	(416) 756-0711
ATI VGA Wonder	N/A	2,3,5	02E0 [1]	02EC, 02E8 (Bus mouse)	N/A	COM3–4, EMS, FAX, HD, NET, SCAN	(416) 756-0711
ATI VGA Wonder XL24	N/A	2,3,5	02E0 [1]	02EC, 02E8 (Bus mouse)	N/A	COM3–4, EMS, FAX, HD, NET, SCAN	(416) 756-0711
Matrix Impression Ultra	N/A	9	7C00	N/A	N/A	EMS, HD, NET, SCAN	(800) 462-8769, (514) 685-2630
Matrix Impression 1024	N/A	9	N/A	N/A	N/A	EMS, HD, NET, SCAN	(800) 462-8769, (514) 685-2630
Video Seven VRAM II Ergo	2	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(510) 656-7800
Video Seven VESA VGA	2	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(510) 656-7800
Video Seven WAK VGA	2	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(510) 656-7800
Video Seven 1024i Plus	2	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(510) 656-7800
Artist Graphics WinSprint 100+ [1]	N/A	N/A	N/A	N/A	N/A	COM3–4, EMS, FAX, HD, NET, SCAN	(800) 637-8478, (612) 631-7800
Artist Graphics X(1000) [1]	N/A	N/A	03E0	02C0–02E0,02C0,03F0	N/A	COM3–4, EMS, FAX, HD, NET, SCAN	(800) 637-8478, (612) 631-7800
Artist Graphics X(5 [1]	N/A	N/A	03E0	02C0–02E0,02C0,03F0	N/A	COM3–4, EMS, FAX, HD, NET, SCAN	(800) 637-8478, (612) 631-7800
Western Digital/Paradise SuperVGA	N/A	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(714) 932-4900
Western Digital/Paradise Accelerator Card for Windows	N/A	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(714) 932-4900
Boca Super VGA	N/A	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(407) 241-8088
Boca Super VGA Accelerated	N/A	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(407) 241-8088
Boca Super VGA Brilliant Color	N/A	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(407) 241-8088
Boca Super X Accelerator VGA	N/A	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(407) 241-8088
Hercules VGA Card	N/A	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(510) 623-6030
Hercules Graphics Card	N/A	N/A	N/A	N/A	N/A	FAX, LPT1–2, SCAN	(510) 623-6030
Number Nine #9 GXE	N/A	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(617) 674-0009
Number Nine #9 GXETC	N/A	N/A	02A0	02A0,02F0,02B6–02B9	N/A	EMS, HD, NET, SCAN	(617) 674-0009
Sceptre VGA	2	5	N/A	N/A	N/A	EMS, HD, NET, SCAN	(408) 737-0888
STB PowerGraph X-24	N/A	2	N/A	02E8	N/A	COM3–4, EMS, FAX, HD, NET, SCAN	(214) 234-8750
Diamond Stealth 24	2	N/A	N/A	N/A	N/A	EMS, HD, NET, SCAN	(408) 736-2000

*With basic video boards, short of having to configure the adapter for a particular monitor, generally there are no IRQ and base address settings that need to be changed.

(1) May conflict with device on IRQ4, address 02E8. (2) DMA channels 0 or 3, and IRQs 9–12 used for voice annotation option. Default DMA channel is 0. (3) Combination card. Fits both ISA and MCA adapter slots.

N/A=not applicable, meaning that the device is either external or doesn't use that resource. In columns labeled alternate settings, where the device listed has a default setting, N/A means that no alternate setting is available.

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Local Bus					
Windows Accelerator		*Yes/1MB*	*Yes/1MB*	*Yes/1MB*	*Yes/1MB*
1.44MB FDD	●	●	●	●	●
1.2MB FDD			●	●	●
Local Bus Slots		*Yes/2*	*Yes/2*	*Yes/2*	*Yes/2*
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DOS

Undocumented Techniques For Customizing DOS 6.0

MAXIMIZE RAM, DELETE PROTECTED FILES, SET LONG PATH STATEMENTS, AND MORE WITH THESE SEVEN SECRET TECHNIQUES. BY JEFF PROSISE

DOS 6.0 COMES PACKED with a plethora of new and improved features. Now push DOS to the limit with these undocumented tips that put you at the helm of the most powerful DOS yet.

INSTALLHIGH on Demand

You already know about the INSTALL command, which loads TSRs from CONFIG.SYS, but that's only half the story. DOS 6.0 supports an undocumented INSTALLHIGH command that loads TSRs into upper memory from CONFIG.SYS on systems that have a 386 or higher processor, just as LOADHIGH loads them into upper memory from AUTOEXEC.BAT.

It's better to load TSRs from CONFIG.SYS, though, because it accepts the question mark parameter (?) and allows for the F5 and F8 keys, which let you skip CONFIG.SYS or pass over it one line at a time. Adding the question mark to a statement that loads a driver or a TSR makes DOS prompt you before executing the program. This is useful when you don't want to waste memory loading a program you don't need at every session. For example, enter this command in CONFIG.SYS to generate a yes/no query before DOS attempts to load the program:

```
INSTALLHIGH?=C:\MOUSE\MOUSE.COM
```

Press Y to load the program or N to skip it. To load TSRs and device drivers HIGH, you need to have EMM386.EXE loaded in CONFIG.SYS with INSTALLHIGH commands after it.

Note: INSTALLHIGH does not support the LOADHIGH /L switch available in AUTOEXEC.BAT, which allows you to specify the memory region that your program loads. A TSR loaded with INSTALLHIGH always is placed in the largest free upper memory block (UMB).

Zap Protected Files Pronto

Do away with the old two-step method for deleting hidden, system, and read-only files. Use DELTREE rather than the combination of ATTRIB and DEL. DELTREE not only deletes directory structures, it also deletes individual files—even if they're protected. To delete the hidden file OLDSYS.FIL, for example, enter this command:

```
DELTREE /Y OLDSYS.FIL
```

For the sake of convenience, enter this command at a prompt to roll the DELTREE command into a DOSKEY macro named ZAP:

```
DOSKEY ZAP=DELTREE /Y $1
```

To delete any file, regardless of its attributes, enter ZAP followed by the name of the file you want to delete. Be careful, since ZAP deletes both files and subdirectories without warning—even those directories that contain hidden or system files.

For greater safety, create a ZAP macro to delete files only. At a prompt, enter the following command to create the macro.

```
DOSKEY ZAP=ATTRIB -H -S -R $1 $T
  DEL $1
```

Long Paths, Shorter Work

One of DOS's long-standing deficiencies is the 127-character limit it places on commands. This is particularly painful when you're dealing with the PATH statement, because it limits the length of the PATH environment variable to 122 characters (plus five for PATH=).

DOS Helper — PC/Contact

FormCmdr 1.6

One thing DOS still makes you do is type on a command line. Even DOSSHELL is too limited at some functions, especially formatting floppies and setting attributes on files. That's where Toy-Jee Software's FormCmdr makes a big difference. FormCmdr lets you pick format options from a menu without having to memorize difficult switches. It even has a Warp Drive option that lets you add the /AUTOTEST switch to your format.

Download FormCmdr and its companion Directory Commander (the $15 registration fee will get you both) from *PC/Computing*'s online forum, PC/Contact, under the filename DOSUTL.ZIP in data library 3 (Utilities/Misc.), or write the company at P.O. Box 835, Department RD, Lexington, VA 24450.

DOS 6.0 finally breaks through this limit by allowing PATH statements to be created in CONFIG.SYS with a SET command.

To set up a long PATH statement, open AUTOEXEC.BAT in EDIT, DOS's text editor. Move down to the PATH statement, press Home, press Shift-End to block the entire PATH line, and press Shift-Del to cut the statement. Without exiting EDIT, press Alt-F, O to open a file, type in CONFIG.SYS, and press Enter. Press Y when prompted to save the file, and CONFIG.SYS appears in the editing screen. Press Ctrl-End to get to the bottom of your document, and press Shift-Ins to paste the old path into CONFIG.SYS. Press Home to return to the beginning of the new path line, and insert SET and a space before the PATH statement. For example, this statement adds DOS, WINDOWS, and UTILS to the path environment:

```
SET PATH=C:\DOS;C:\WINDOWS;C:\UTILS
```

Press End to reach the end of the statement and add more directories separated with semicolons without worrying about the line's length. Press Alt-F, S to save the file, and Alt-F, X to exit EDIT. Reboot the computer to make your changes take effect.

Note: DOS won't show any directories past the 127-character limit when you enter PATH at a DOS prompt.

Even More RAM—Really!

Get more RAM than you ever thought possible by remapping unused video memory into conventional memory. If you have a color video card and you run only character-based programs, add the following to the EMM386.EXE line in your CONFIG.SYS:

```
I=A000-B7FF
```

If you're hooked up to a monochrome video adapter, modify the switch to read I=A000-AFFF. These switches configure EMM386.EXE to convert most of the video buffer to usable RAM. Since this usable RAM lies adjacent to conventional memory, EMM386.EXE links it with conventional memory rather than configuring it

/// Hot Tips ///

Quick and Easy Disk-to-Floppy Copies

Do away with "disk full" messages when copying files from a directory to a floppy. This batch file uses XCOPY's /M switch to copy as many files as it can before your disk fills up. It then prompts you to insert a new disk and resumes copying until the job is done.

Enter the following lines in an ASCII text editor, and then save the file as FCOPY.BAT:

```
@ECHO OFF
IF "%1"="" GOTO SYNTAX
ATTRIB %1 /S +A
:AGAIN
XCOPY %1 %2 /M %4 %5 %6 %7 %8 %9
IF ERRORLEVEL 4 GOTO NEWDISK
GOTO END
:NEWDISK
CD\
CLS
ECHO Your target disk is full; please
ECHO place another disk in DRIVE %2.
PAUSE
GOTO AGAIN
:SYNTAX
ECHO FCOPY [source path\files] [destination path]
:END
```

To use the batch file, enter FCOPY followed by the directory path, filenames (all wildcards accepted), and the destination drive.

CLIFFORD B. WILLIAMS

Set Colors and Borders Fast

If you find DOS's gray-on-black screen an eyesore, liven up its colors with these COM programs. First, open CONFIG.SYS in a text editor and add this line if it doesn't already exist:

```
DEVICE=C:\DOS\ANSI.SYS
```

Save the file and reboot your computer to make the change take effect. Then enter these lines in the text editor, and save the file as COLOR.SCR:

```
N COLOR.COM
E 100 8A 0E 80 00 80 F9 01 7E
E 108 1C FE C9 B5 00 B4 02 B2
E 110 1B CD 21 B2 5B CD 21 BB
E 118 82 00 8A 17 43 CD 21 E2
E 120 F9 B2 6D CD 21 CD 20
RCX
27
W
N BORDER.COM
E 100 8A 0E 80 00 80 F9 01 7E
E 108 0D B4 0B B7 00 8A 1E 82
E 110 00 80 EB 30 CD 10 CD 20
```

CONTINUED ON PAGE 204

as upper memory block (UMB) RAM.

Note: If your system uses an extended BIOS, the extra RAM will not be linked with conventional memory; instead, you'll gain an extra 96K of UMB RAM or 64K on monochrome systems.

This extra memory could someday prove to be a lifesaver. Large application programs such as dBASE need all the conventional memory they can get. And if you ever get an "Out of memory" error with DOS 6.0's DEFRAG utility, remapping your unused video memory may be the only way to give it the additional RAM it needs.

Faster Formats

Formatting a set of disks? Enter this command to format a disk with no warning messages and no pauses for confirmation:

```
FORMAT A: /AUTOTEST
```

Caution: If you format a disk with a rated capacity less than the full capacity of the drive (say a 720K disk in a 1.44MB drive) specify the disk's formatted size with a /F switch. This command formats a 720K floppy in a 1.44MB drive, for example:

```
FORMAT A: /AUTOTEST /F:720
```

Install Without Extra Disks

Bypass DOS 6.0's need for two extra unformatted disks during installation. DOS 6.0 asks for the disks as a safeguard in case you want to restore the older version. But if you're installing DOS on multiple systems, this safeguard becomes a hassle. To proceed with installation without extra disks, insert the DOS Setup disk in your bootable drive, and enter this:

```
SETUP /G
```

High Memory Check

Need a quick way to find out whether DOS is loading into high memory on your system? Enter VER with the undocumented /R switch. In addition to reporting the version and revision of DOS on your PC, it will tell you whether DOS is loaded into high memory area (HMA). This information is useful if you have to reserve HMA space for NetWare shells. ◪

Hot Tips

CONTINUED FROM PAGE 203

```
RCX
18
W
Q
```

Next, create the two programs: Enter DEBUG < COLOR.SCR at a prompt to create COLOR.COM and BORDER.COM. Then enter these lines in a text editor and save the file as COLORS.BAT:

```
@ECHO OFF
IF [%1]== [] GOTO MISSING
FOR %%Z IN (0 1 2 3 4 5 6 7) DO IF %1==%%Z GOTO SETCOLOR
:MISSING
Echo Syntax [Text style] [Text color] [Bkgrnd color]
ECHO Available Choices
Echo Style: [0] Normal [1] Bold
Echo Color: [0] Black [1] Red [2] Green [3] Yellow
Echo [4] Blue [5] Mgnta [6] Cyan [7] White
PAUSE
GOTO END
:SETCOLOR
COLOR %1;3%2;4%3
CLS
:END
```

To use the program, enter COLORS followed by the numbers representing the text style attribute, the text color, and the background color. For example, enter this command to transform your screen into one with bold cyan text and a dark blue background.

```
COLORS 1 6 4
```

Next, enter these lines to create a batch file to set borders, and save the file as BORDERS.BAT:

```
@ECHO OFF
IF [%1]== [] GOTO MISSING
FOR %%Z IN (0 1 2 3 4 5 6 7) DO IF %1==%%Z GOTO SETBORD
:MISSING
ECHO Borders sets a colored edge around your screen.
ECHO Enter one of the following colors:
Echo [0] Black [1] Blue [2] Green [3] Cyan
Echo [4] Red [5] Mgnta [6] Yellow [7] White
GOTO END
:SETBORD
BORDER %1
:END
```

To use the program, enter BORDERS followed by the number of a color. For example, enter this at a prompt to set a blue border around the edge of your screen:

```
BORDERS 1
```

Colors are stored only for each session. To make your favorite color and border combination permanent, insert it into AUTOEXEC.BAT.

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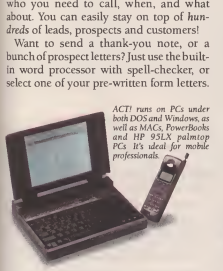

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Trim the Fat from Your Windows Directories

SAVE DISK SPACE AND IMPROVE PERFORMANCE BY REMOVING DUPLICATE FILES. **BY CRAIG STINSON**

YOUR HARD DISK is probably littered with redundant files. If you've installed many new applications or upgraded Windows, chances are you have at least a few duplicates of key executable files.

Why worry about these duplicates? First, you may be wasting disk space. Second, Windows or your applications may not be using the most current version of critical files. In some cases, applications perform poorly or even crash when they expect one version of a system file and find a different version.

Your applications run better and you regain valuable disk space when you remove redundant files. Here's how to root them out.

Find Duplicate Files

To get rid of redundant dynamic link libraries (DLLs), first determine what duplicates you have. The fastest way is to use this month's Winapp, File Deduplicator from Babbacombe Computers, but Windows has all the tools you need to do it yourself. In File Manager, select the root directory of your hard disk, and choose File, Search. In the Search For box, type COMMDLG.DLL. If you have more than one hard disk, repeat this process for each disk.

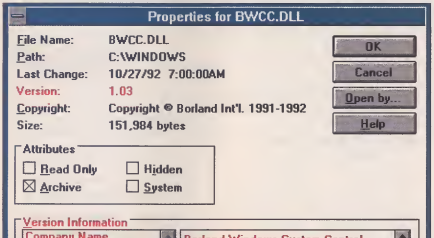
The file COMMDLG.DLL contains the common dialog library, a chunk of code that many Windows applications (including all Microsoft programs) use to draw file-management dialog boxes. This DLL causes many application dialog boxes to look the same—they're all using the same code. Other programs share different DLLs—for example, Borland's programs use BWCC.DLL, the Borland Windows Custom Controls library.

Like all other programming code, DLLs are constantly being upgraded. Software installation routines often install the latest version of BWCC, COMMDLG, or other DLLs on your system, whether you need them or not.

In addition to COMMDLG.DLL and BWCC.DLL, check for duplicates of VER.DLL, VBRUN100.DLL, VBRUN200.DLL, SMARTDRV.SYS, SMARTDRV.EXE, HIMEM.SYS, EMM386.SYS, EMM386.EXE, RAMDRIVE.SYS, and EXPAND.EXE. In my own system, I found about 4.5MB of duplicates—a hefty chunk.

When you find identically named files, check the time and date of each. In most cases, the only version you need is the one with the latest date. Be careful, though. Sometimes a program's setup routine assigns the installation date to all its files, thereby masking the creation date for the component file you're interested in. If the duplicated DLL has the same date as every other system file in its directory, the date is probably not a reliable indicator of the DLL's revision history.

If you're using Windows for Workgroups, check each duplicate file with File Manager's Properties command by holding down the Alt key and double-clicking on its filename. Unlike its predecessor in Windows 3.1, the Windows for Workgroups Properties command includes spaces where vendors can report version numbers, copyright information, a brief description of a file's purpose, and other information that will help you determine the most current version of a file.



File Manager's Properties dialog box helps you determine the most recent version of duplicate files. Windows for Workgroups adds more detailed information (in red).

Winapp of the Month

File Deduplicator

You could spend hours using File Manager to sift through duplicate files, or you could use File Deduplicator from Babbacombe Computers and get the job done in seconds. Once File Deduplicator locates duplicates, it provides several options for comparing versions and for deleting the ones you don't want. Download DEDUPE.ZIP from PC/Contact's data library 3 (Utilities/Misc.) or order it from Public Brand Software at (800) 426-3475. PC/Contact

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Delete Safely

Once you have determined the latest version of a system file, rename all the other versions of the file and move them into a temporary directory, in the event that you need them later. Then move the latest version of the file into your Windows directory. (Another option is to move system files into the SYSTEM subdirectory, but if you have duplicate files in both WINDOWS and SYSTEM, your programs will use the one in Windows.)

Next try all the applications that use that file to see whether the programs still run smoothly. If you're not sure which applications those are, just work with your system for a while and hold on to the renamed variants. If everything continues to work normally, you can then move the renamed duplicates onto a floppy disk for safekeeping and enjoy the luxury of your expanded hard disk space.

Remove Old Microsoft Files

To eliminate redundancy in your Microsoft system files (HIMEM, SMARTDRV, and so on), simply check the files' time stamps. Microsoft uses a standard scheme for its Windows and DOS program files. If a file's time stamp is 3:00, it came with Windows 3.0. The time stamp 3:10 belongs to Windows 3.1 files, and 3:11 signifies a Windows for Workgroups file. Finally, time stamps for 5:00 and 6:00 indicate DOS 5.0 and 6.0, respectively.

The safest policy concerning these files? Let Microsoft's Setup routines modify your CONFIG.SYS and AUTOEXEC.BAT files, and don't second-guess the Setup programs' decisions. The only exception to this rule is the DOS 6.0 version of SmartDrive. This version is optimized for disks that use DoubleSpace, DOS 6.0's file-compression feature. If you aren't using DoubleSpace, you'll get better performance from the Windows 3.1 or Windows for Workgroups version.

Following is a list of Microsoft system files that you should delete if you own recent versions of DOS or Windows. The list also includes their file sizes in bytes. The totals at the bottom of the columns represent the amount of disk space you'll save by deleting these files if you have more current ones.

Hot Tips

Instant Access to Control Panel Tools

Control Panel's tools are indispensable, but using Control Panel to get to them is slow and cumbersome. It's slightly faster to select File, Run and type CONTROL followed by the name of the tool you want, such as COLOR. But for really speedy access, give Control Panel tools their own Program Manager icons. You'll get the tool you want with one double-click.

To create quick-access icons for Control Panel tools, first open File Manager and switch to the SYSTEM subdirectory under your Windows directory. Choose View, Sort By Type, then select all four files with .CPL extensions—CPWIN386.CPL, DRIVERS.CPL, MAIN.CPL, and SND.CPL. Choose File, Associate, click on Browse, switch to your Windows directory, and select CONTROL.EXE. Click on OK to return to the Associate dialog box, then click on OK again.

Arrange File Manager and Program Manager so that both are visible. Click on the four CPL files you selected in File Manager, and drag them into a Program Manager group to create program items for them. The Cpwin386 icon launches Control Panel's 386 Enhanced tool, Drivers runs the Drivers tool, Snd calls up the Sound tool, and the Main icon launches the Color tool.

To assign Control Panel's original tool icons to the new Program Manager items, press Alt and double-click on each icon to call up its Program Item Properties dialog box. Click on Change Icon, click on Browse, type *.CPL in the File Name box, and specify the SYSTEM subdirectory. Select one of the CPL files, then click on OK to return to the Change Icon dialog box and pick an icon.

MAIN.CPL also contains the Fonts, Ports, Mouse, Desktop, Keyboard, Printers, International, Date/Time, and Network tools. To create quick-access icons for them, first copy the Main icon: Hold down the Ctrl key as you click on the icon and drag it to a new location. Then hold down Alt and double-click on the new icon. Type a description, then press Tab to move to the Command Line box. Press Home to move to the beginning of the command line and type CONTROL followed by a space. Press End to move to the end of the command line, press the space bar once, then type the name of the tool you want. Finally, select a new icon and click on OK.

Note: If you've installed a program or peripheral (such as Microsoft's Sound System) that adds tools to Control Panel, you may find additional CPL files in your SYSTEM subdirectory. Simply drag those files from File Manager into a Program Manager group to create quick-access icons for them as well.

DYLAN TWENEY

Push-Button Modem Management

Want to hold all calls during an important meeting, muffle your whining modem, or shut it up completely? Use Terminal to do it all at the push of a button: Assign Hayes AT commands to Terminal's function keys. To assign a command to a function key, select Settings, Function Keys in Terminal. In the left-hand box, type the title for the corresponding function key, and put the Hayes AT command you want in the right-hand box. Ensure that the Keys Visible box is selected, then click on OK. Click on the button that you want to run its command.

To adjust your modem's noise level, name one button Mute the Modem and

CONTINUED ON PAGE 214

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Circle 184 on reader service card.

	DOS 5.0	Windows 3.1	DOS 6.0
EMM386.EXE	91,742	110,174	115,294
EXPAND.EXE	14,563	15,285	16,129
HIMEM.SYS	11,744	13,824	14,208
MSD.EXE	N/A	155,538	158,470
RAMDRIVE.SYS	5,873	5,873	5,873
SMARTDRV.EXE	N/A	43,609	42,073
SMARTDRV.SYS	8,335	N/A	N/A
Total	**132K**	**344K**	**352K**

DOS 5.0's SMARTDRV.SYS is superseded by SMARTDRV.EXE in Windows 3.1 and DOS 6.0, so delete SMARTDRV.SYS if you have the EXE version. MSD.EXE, the Microsoft Diagnostics program, was introduced with Windows 3.1, so you won't find it among your DOS 5.0 files. If you've installed DOS 6.0, however, delete the old version of MSD.EXE, and you'll save 150K.

Clear Out Extraneous Files

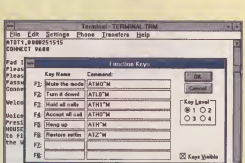
Once you've removed all the duplicate system files from your hard drive, remove the files from your Windows directory that you don't use. If you don't use wallpaper, delete all the BMP files: In File Manager, select your Windows directory and choose File, Search. Specify *.BMP and click on OK. Then select all the BMP files in the Search window you want to delete, and press Del to remove them.

Do the same with other extraneous files. Use File Manager to search for all the WRI files in the Windows directory. Since they contain Windows' "read me" information, choose File, Print to print them out and put them aside for safekeeping, then delete them. Screen savers (SCR files) that you don't use should be deleted as well. If you don't have a sound device, delete all WAV files, along with SOUNDREC.EXE and SOUNDREC.HLP, the Sound Recorder's program files. Delete the Media Player's files, too—search for MPLAYER.* and delete all the files you find. Don't use a particular accessory, such as Terminal? Delete TERMINAL.* and *.TRM to remove Terminal's files. Do the same for Cardfile and Calendar, if you don't use them—delete CARDFILE.*, CALENDAR.*, *.CRD, and *.CAL to save at least 200K. Finally, delete the Windows tutorial, WINTUTOR.EXE—you've gone way beyond what it can teach you by now, and it takes up almost 125K of hard disk space by itself.

Hot Tips

CONTINUED FROM PAGE 212

another Turn It Down. The command to mute the modem is ATM0^M. To make the modem as quiet as possible without silencing it completely, use the command ATL0^M.



Ta prevent a phane that shares a line with your madem fram ringing, name a buttan Hald All Calls, and assign the command ATH1^M ta it. Ta turn aff that aptian, name a secand buttan Accept All Calls using the command ATH0^M.

Ta hang up the line, name another buttan with the command ATH^M. Ta restare the madem's ariginal settings, use ATZ^M. And far a buttan that repeats the mast recent madem command, use A/^M.

Once yau've made all the key assignments yau want, save the file as MODEM.TRM. Then create a Pragram Managerican with the command line TERMINAL.EXE MODEM.TRM ta launch Terminal with the madem-cantral file already laaded and ready to use.

MATTHEW LAKE

Archive Files in File Manager

PCContact

Make a simple Recarder macra ta campress files with a single keystrake by using yaur favarite file-campressian pragram.

Start Recarder and chaase Macra, Recard. Name the macra, specify a shartcut key, and be sure that yau've selected Playback Ta: Same Applicatian and Speed: Fast. In the Recard Mause bax, select Ignare Mause. Click an Start ta begin recarding.

Using anly the mause, switch ta File Manager and select ane or mare files yau want ta campress. Then press Alt-F, P ta bring up the Print dialag bax. Press Shift-Del ta cut the filenames and put them an the Clipbaard. Then press Esc ta cancel the Print dialag bax and press Alt-F, R ta bring up the File Run dialag bax. Type the path and name af yaur campressian-pragram file, including the camman-line switches ta add files ta an archive, and the path and name af a temparary archive file. If yaur file-campressian pragram is PKzip, use the camman line PKZIP - A C:\TEMP ta archive files ta a temparary file called TEMP.ZIP in yaur raat directary. If yau use LHA, type LHA A C:\TEMP ta archive files ta TEMP.LZH in the raat directary. Then press the space bar ance and press Shift-Ins ta insert the filenames yau capied. Press Enter ta run the completed camman line.

Use anly the mause ta minimize File Manager and any ather apen applicatians, and click an the blinking Recarderican. Select Save Macra and click an OK. Ta save the macra file, return ta Recarder and chaase File, Save.

Ta use the macra, select the files yau want ta archive in File Manager and press the macra's shartcut key. Ta archive additianal files, select them and run the macra again—they'll be added ta the temparary archive. Once the temparary file cantains everything yau want it ta have, rename it and mave it ta anather directary ar disk.

Nate: A file with this macra (plus several athers) is available far dawnlaading as ALLREC.ZIP fram PC/Cantact's data library 1 (Hat Tips/Secrets), ar an disk fram Public Brand Saftware. See page 225 far details an haw ta get the macra file.

DYLAN TWENEY

results and reader feedback continue to suggest that DOS 6.0 DoubleSpace is causing significant problems on a wide variety of DOS machines.

– *InfoWorld*
May 10, 1993

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EXPERT ADVICE TO HELP YOU TAP THE HIDDEN RESOURCES OF POPULAR APPLICATIONS AND UTILITIES

WORD FOR WINDOWS

QUICK WORD COUNT

Though it's possible to get a word count from File, Summary Info, this information is buried several layers deep. Create a macro to provide a quicker update. Choose Tools, Macro, enter UPDATE as the new macro name, and click on Edit. Enter the following between the Sub MAIN and End Sub lines:

```
FileSummaryInfo .Update
Dim dlg As FileSummaryInfo
GetCurValues dlg
a$ = dlg.NumWords
MsgBox("The number of words in
  this document is ")+a$
```

Now choose File, Close, and click on OK to save. To attach hotkeys to the macro, choose Tools, Options, and click on the Category type until the Keyboard icon appears. Ensure that Global Macros is selected, choose an appropriate hotkey combination, then click on Add, Close.

ROBERT BAYLEY
ASSISTANT EDITOR

FLAG EXTRANEOUS WORDS

Sharpen your prose by excluding neutral words such as *fairly, rather,* and *maybe* from the Word for Windows dictionary file SP_AM.LEX. Create an exclusion dictionary by starting a new file and entering one forbidden word per line followed by a return. Save it as a text-only file called SP_AM.EXC in the same directory as the current dictionary file (C:\WINWORD).

When you spell-check, Word compares your spelling with the dictionary's and cross-references to the exclusion dictionary. The spell-checker flags words in the exclusion dictionary and suggests alternatives.

ALAN WALKER
LOS ALTOS, CALIFORNIA

WORDPERFECT

HIDE TABLES FOR PRINTING

Tables slow down printing in WordPerfect, but you don't have to remove them to speed up draft printing. Press Shift-F7, G (Graphics Quality), and 1 (Do Not Print), and the table lines won't print. To replace the lines for the final copy, simply change the graphics quality to medium or high. To do the same in WordPerfect for Windows, choose File, Print, and set Graphics Quality to Do Not Print.

DEBRA BOWDEN
WELLESLEY, MASSACHUSETTS

WORDPERFECT FOR WINDOWS

VARY MACRO FILE EXTENSIONS

Unclutter your WordPerfect for Windows macro directory list by using different file extensions for different types of macros. The default extension for macro files is .WCM. When you choose Macro, Play, a dialog box lists all the files with that extension in your macro directory. If you've created dozens of macros, the list is too

Step by Step: Word for Windows

WRITE FASTER WITHOUT SCREEN CLUTTER

Increase your screen space at the touch of a key with a Word for Windows macro (Version 2.0B or later) that switches between your normal editing mode and full-screen draft mode.

Step 1: Select the Macro Editor.
Choose Tools, Macro, and type SCREENCLEAR for the macro name. Type a description in the box at the bottom. Ensure that Global Macros is selected, and click on Edit.

Step 2: Add the macro text.
Enter the following lines between the Sub MAIN and End Sub lines:

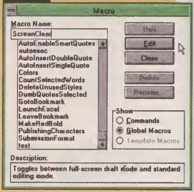
```
VPosition = Val(AppInfo$(5))
If VPosition < -3 Then
ToolsOptionsView.FullScreen = Ø
ViewDraft Ø
Else
ToolsOptionsView.FullScreen = 1
ViewDraft 1
EndIf
```

Choose File, Close. Then click on Yes to save your macro. *Note:* The next time you close Word, it will ask if you want to save the global glossary and command changes. Make sure you click on Yes, or you'll lose your new macro and its shortcut key.

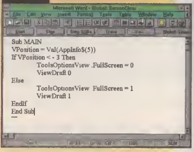
Step 3: Assign the hotkeys.
Assign a shortcut key to the macro by choosing Tools, Options. Select the Keyboard category and click on OK. Then, click on the Macros and Global buttons, and highlight the ScreenClear macro. Specify a shortcut key, click on Add, and then Close. Press the shortcut key to switch between full-screen draft mode and your regular editing screen.

DYLAN TWENEY
ASSOCIATE EDITOR

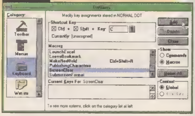
STEP 1



STEP 2



STEP 3



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SO ADVANCED IT EVEN TURNS ITSELF OFF.

PC MAGAZINE EDITORS' CHOICE
June 30, 1992
FlexScan F550i

Nanao, the technical leader in monitors has done it again. In addition to being the top choice of today's graphics professionals and Windows users, Nanao's award-winning FlexScan F-Series monitors now have a remarkable energy-saving system — Power Save.

Built into Nanao's new 17-inch FlexScan F550iW and 21-inch F760iW, Power Save has been designed to work with all screen saver software, including Windows 3.1 and After Dark. Power Save activates when the blank screen of the screen saver appears, cutting operating power to less than 8% of total consumption. It can also automatically power the monitor down to a stand-by mode when the computer is turned off. These innovations add up to energy savings and longer monitor life, and have placed Nanao at the forefront of the Environmental Protection Agency's EnergyStar Program.

Both the F550iW and F760iW exhibit their superiority in many other ways, as well. Each Invar Shadow Mask CRT has a new anti-reflective coating that eliminates reflection of ambient illumination, without sacrificing the focus level and brightness. Ultra-high resolutions with large screens plus other features make them ideal for CAD/CAM, DTP and Windows applications. On top of that, they can power down. So when you're not working, neither are they.

Nanao FlexScan monitors. Intelligently designed. Incredibly useful. And now, built to help protect our environment by reducing energy consumption.

**The Energy Star emblem does not represent EPA endorsement of any product or service.*

PC Computing MVP WINNER
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PC MAGAZINE EDITORS' CHOICE
March 16, 1993
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long for you to find what you need quickly.

A macro will execute no matter what extension you give it. When you record or write a macro, use the extension .MEN for macros assigned to the macro menu, and .MAC for macros that you execute only from another macro.

In order to list these macros, replace the *.WCM file spec that appears in the Filename box with a file spec that matches your macro. Otherwise, the macros with .BAR, .MEN, and .MAC extensions won't be listed, leaving you with a shorter list of .WCM macros to browse through.

RON WHITE
EXECUTIVE EDITOR

AMI PRO

BEAT THE MERGE-RECORD LIMIT

Overcome Ami's limit of 2,044 characters per merge record by changing a line in the AMIPRO.INI file. Use Notepad or another text editor to open AMIPRO.INI from the Windows directory. Use Search, Find to locate the GLOSSARYSIZE line. To set a new maximum length of 3,068 or 4,092 characters for merge records, change the GLOSSARYSIZE to 3 or 4. Choose File, Exit, and select Yes to save your changes.

GEORGE BEINHORN
CONTRIBUTING EDITOR

QUATTRO PRO FOR WINDOWS

RENUMBER FASTER

Save time while renumbering your spreadsheet data. This formula adjusts row numbers when you insert or delete. You could use the formula A1+1, but your column will show reference errors if you insert or delete a row. Enter the following formula in cell A2, and copy it as needed. Enter any number in cell A1 to begin your numbering sequence.

```
@CELL("ROW",A2) -
  @CELL("ROW",$A$1)+$A$1
```

Adjust this formula for use in another column by changing the references to A1. The formula also works for Quattro Pro for DOS and Excel.

ALAN WALKER
LOS ALTOS, CALIFORNIA

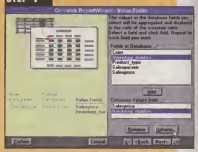
Step by Step: Microsoft Excel

FIND THE BEST IN A FIELD WITHOUT FORMULAS

Want to find your top salesperson and best-selling product in an Excel database in one step? You can—without writing a single formula—with the Crosstab ReportWizard. To invoke a two-way cross-tabulation, your database must contain named fields for salesperson, product type, sales price, and inventory number.

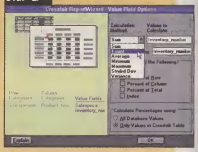
Step 1: Define the fields to tabulate.
Highlight the database portion of your worksheet and select Data, Crosstab. In the Crosstab ReportWizard box, click on Create a New Crosstab. In the Fields in Database box, select Salesperson as your Row category, then click on the Add and Next buttons. Select Product_type as your column category, then click on Add and Next again. Finally, select two Value Fields: Select Salesprice and click on Add, then select Inventory_number, Add, Options.

STEP 1



Step 2: Set the calculation method.
Ensure that Values to Calculate reads Inventory_number, then click on the Calculation Method drop-down menu and select Count. Click an OK, and then on Next.

STEP 2



Step 3: Arrange your value fields.
Once you've selected more than one value field, the Wizard prompts you for a multiple field layout technique. Select Outer Rows, then click on Next. In the final Wizard screen, click on Create It. This triggers the Wizard to create the necessary formulas and compute the report, which appears in a new worksheet.

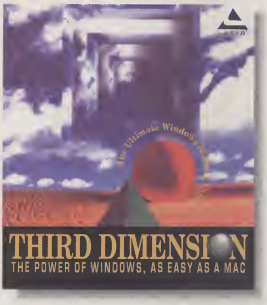
STEP 3

Step 4: Sort your results.
To rank the salespeople's sales in dollars in descending order, select the block of cells that includes salespeople's names and all columns through the Grand Total column. Select Data, Sort, and sort the Grand Total column. Check the Descending button and click on OK. Repeat the process for the Count of Inventory_number cells. To arrange products in descending order of popularity, select the block of cells that includes the product labels and all rows through the Grand Total row; select Data, Sort, and sort by columns in descending order, using the inventory count row as your key. To make your crosstab report more legible, collapse the outline across Row and Column Categories fields by clicking on the minus-sign buttons in the margins. After you've collapsed the outline, the buttons change their sign from minus to plus. To expand the report, click on the plus sign.

RICARDO DOBSON
LOUISVILLE, KENTUCKY

STEP 4

Windows Cleaner.



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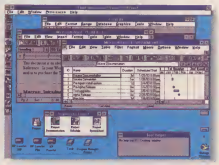

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Circle 154 on reader service card.

EXCEL

FIX BAD FORMULAS

Debugging a series of complex formulas is a waste of valuable time. You can isolate errors more quickly by calculating one portion of the formula at a time.

First select the cell and press F2. Next, select an expression using the mouse or by holding down Shift as you move the cursor with the arrow keys, and then press F9. Excel compiles the numeric expression into a value. Repeat this process as necessary until the entire formula produces a value.

ALAN WALKER
LOS ALTOS, CALIFORNIA

PARADOX FOR WINDOWS

A GALLERY OF GRAPHS

Change graph types quickly and easily with a drop-down list box of your own design.

First, select File, Open, Form from the Paradox menu. Choose an existing form, open the design mode, and click on OK. Then use the Box tool to create a frame around both your graph and a button that will call up a list of graph types. Use the Graph tool to place your graph in the box, then right-click on the graph to define its values. Right-click on the box, then click on the top line of the box (the one marked with three periods), and rename it something like TotalBox. Change the graph name to SalesChart in the same way.

Next, change the button label to Chart Type, and right-click on the button to open the Property Inspector. Select Methods, pushButton method, and type the following lines:

```
var
arrFive array[5]string
pop popupmenu
choice String
endVar
arrFive[1]= "XYGraph"
arrFive[2]= "2DBar"
arrFive[3]= "2DColumns"
arrFive[4]= "3DBar"
arrFive[5]= "3DPie"
pop.addstatictext("Available Graph
  Formats")
pop.addseparator()
pop.addArray(arrFive)
choice=pop.show()
if choice<>"" then
  TotalBox.SalesChart.Graphtype=
  choice
endif
```

Close the dialog box, and press F8 to enter Edit mode. When you click on the Chart Type button, a list of five options appears. Select one of the chart types to update your graph instantly.

JOHN TASCHEK
ASSOCIATE TECHNICAL EDITOR

PRESERVE REFERENTIAL LINKS

You can lose established referential links when you use Paradox's File, Utilities, Copy command. Instead, use the DOS COPY command to retain the links when copying files. Referential links enable you to ensure the validity of a value before it's accepted into a field by comparing the value with data in another field. Remember to copy all associated files, forms, and databases along with your table.

If you do use the File, Utilities, Copy command, rebuild your referential links by using the Table, Restructure command.

WILLIAM BEEM
ORLANDO, FLORIDA

FOXPRO FOR WINDOWS

SUPERCHARGE YOUR DATABASE

Speed up FoxPro for Windows by directing the temporary files to a RAM disk. If you have at least 8MB of RAM, add this line to your CONFIG.SYS file:

```
DEVICE=C:\WINDOWS\RAMDRIVE.SYS
  2048 /E
```

Reboot the computer, and a 2MB RAM drive appears as your next available drive letter (D: in our example here). Next, use an ASCII text editor to open or create CONFIG.FPW in your FoxPro directory. If you use a network version, create CONFIG.FPW, save it onto your local C: drive, and add these lines:

```
PROGWORK=D:\
TMPFILES=D:\
```

Two other temporary work variables are available—EDITWORK deals with temporary files from the FoxPro editor, and SORTWORK handles sorting and indexing—but don't use these unless you designate a RAM drive at least four times the size of your working files. Next, select the FoxPro program item, and press Alt-Enter to open the Program Item Properties dialog box. At the command line, press the End key and insert this command:

```
-CD:\CONFIG.FPW
```

Do not add a space after the *C* and before the path pointing to CONFIG.FPW. You'll have to reboot for the changes to take effect. If FoxPro can't find the file, it will use a default setting.

JOHN TASCHEK
ASSOCIATE TECHNICAL EDITOR

DBASE

MORTGAGE CALCULATOR

If you're considering refinancing or buying a home, try this dBASE IV function: PAYMENT() calculates the principal and interest for a monthly mortgage payment. The function prompts you for the home's sale price, the amount of the down payment, the annual interest rate, and the length (in years) of the mortgage. Exclude the dollar sign when you're inputting the sale price and down-payment amount, and enter the interest rate without the percent sign.

```
SET TALK OFF
INPUT "Sale price: " TO sp
INPUT "Down-payment amount: " TO dp
INPUT "Annual interest rate: " TO ir
INPUT "Mortgage length (years): "
  TO ml
pmt = PAYMENT((sp - dp),(ir * .01
  / 12),(ml * 12))
?
? "Monthly principal + interest is"
?? pmt AT 32 FUNCTION "$B"
```

ROGER W. SAUER
FAIRFIELD, CALIFORNIA

ASSIGN WORDS TO A KEY

Don't waste time retyping words or phrases you often need—assign them to function keys and enter them accurately with a single keystroke. To assign name titles to a series of function keys, for example, type the following lines at the dot prompt:

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Psygnosis
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Scherrer Resources, Inc.
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```
SET FUNCTION 6 TO "Mr."
SET FUNCTION 7 TO "Mrs."
SET FUNCTION 8 TO "Ms."
```

Any time you need to enter the name prefix, press the function key corresponding to the title. To instantly add *Ms.* to a title field in your form, for example, press F8 while your cursor is in the field.

To see your current function-key assignments, type SET at the dot prompt. The Keys menu lists the function keys and the text that's been assigned to them. To change an assignment, highlight it, press Enter, type the new text, and then press Enter again.

DANA BOSWELL
TIFFIN, OHIO

POLARIS PACKRAT

LAUNCH APPLICATIONS QUICKLY

Create an application-management facility to launch your programs from within PackRat. Click on the Disk File Management icon, select Options, Create Overlay, and name the overlay Applications. Type in the names of key fields that correspond to applications you'll be setting up, then click on the check box to make this overlay your default. Click on OK to close the dialog box, then click on the Disk File Management icon to call up your new overlay.

To create an entry for a program, click on the Browse tool to list your applications, and select a program from this list. Enter the name in a summary field, and click on OK. Repeat the process for each application you want to launch with PackRat. To run the program, highlight the entry, and click on the Launch icon.

HILLARY RETTIG
FOREST HILLS, NEW YORK

NORTON UTILITIES

ACCESS FILES FASTER

Speed Disk's default setting does an adequate job of analyzing your disk for defragmented files, but a little adjustment of the default can lead to significant improvement in hard drive performance. Move your most frequently used files to the inner track of the hard drive while defragmenting and reordering files. Choose Configure, File to Place First, and then insert the filenames of your most frequently used applications, and then click on OK.

Next, you need to ensure the integrity of the read/write operation: Choose Other Options, click on Read-after-Write and Beep When Done, then click on OK. To sort all other files alphanumerically, choose Configure, File Sort and click on Ascending Sort Criterion and Sort Order by Name.

Now, choose Optimize, Optimization Method, Full with File Reorder, and click on OK. Save all these options by choosing Configure and Save options to disk. Finally, press Alt-B to begin optimization.

ROBERT BAYLEY
ASSISTANT EDITOR

Do you know a better, faster, easier, or more effective way to use software applications? Share them with others, and if we publish your secret, we'll send you $50. Send your tips, along with your name, address, and daytime phone number, to Software Secrets, PC/Computing, 950 Tower Lane, 20th Floor, Foster City, CA 94404.

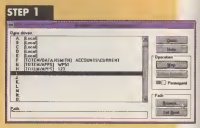
Step by Step: Networking

USE FILE MANAGER TO MAP NETWORK DRIVES

Windows' File Manager makes navigating directories on a NetWare file server as easy as negotiating your hard drive. When you need to get files from another volume or directory, use File Manager to map the path to a drive letter that Windows treats like another hard disk.

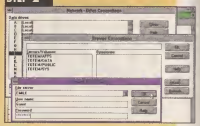
Step 1: Select a drive letter.
In File Manager, choose Disk, Network Connections to open the Network-Drive Connections dialog box. In the Data Drives box, select an unused drive letter. Click on the Browse button to browse for the path you want to map to this drive.

STEP 1



Step 2: Pick a file server and log in.
If the file server you need isn't listed in the Servers/Volumes box on the left, click on Attach to connect to it. Pick a file server from the drop-down list, and enter your password in the Password box. If you connect to the server under another name, such as Guest, change the name in the User Name box to reflect it. Click on OK to connect to the server and return to the Browse Connections dialog box.

STEP 2



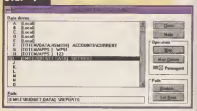
Step 3: Choose a directory path.
After selecting a server and volume, negotiate subdirectories by double-clicking on them in the Directories box. To move up a directory level, double-click on the double dots at the top of the directory list. Once the path is correct, click on OK to return to the Data Drives dialog box.

STEP 3

Step 4: Map the drive letter to the path.
Click on Map to assign the current path to the drive letter you selected. If you want this drive mapping to be available every time you start Windows, put an *X* in the Permanent check box. Click on Close to return to File Manager.

DYLAN TWENEY
ASSOCIATE EDITOR

STEP 4



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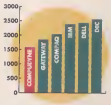

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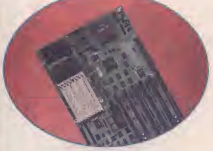

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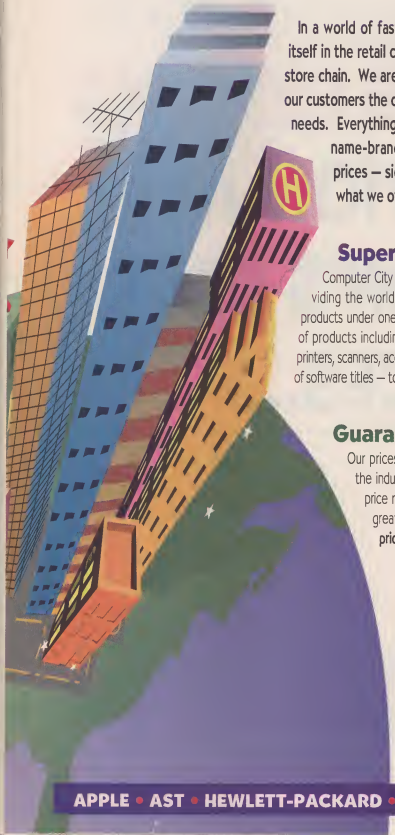

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FormCmdr ..... **DOS, page 202**

Formatting floppies and setting attributes on files? The menu-driven formatting utility FormCmdr lets you select format options from a menu without memorizing difficult switches. FormCmdr and its companion Directory Commander are available as DOSUTL.ZIP in data library 3 (Utilities/Misc.)

File Deduplicator ..... **Windows, page 206**

You could spend hours using File Manager to sift through duplicate files—or you could use File Deduplicator, a shareware program that quickly searches your hard drive for extra copies of the files you specify. Once you've located duplicates, you have several options for comparing versions and for deleting the ones you don't want. Download DEDUPE.ZIP from data library 3 (Utilities/Misc.).

Recorder Macros ..... **Windows Hot Tips, page 214**

Having trouble with the Windows Macro Recorder? Don't despair: All the Recorder macros we've described in the past year are now available in digital format. Look for ALLREC.ZIP in data library 1 (Hot Tips/Secrets).

WinMsg ..... **Q&A, page 232**

WinMsg is a freeware Windows utility that pops up messages in random order from a text file. We've included a list of DOS 6.0 commands, but you can create your own message files using any text editor. This utility is best run from the Startup group for a quick DOS command fix when you start Windows. Look for WINMSG.ZIP in data library 3 (Utilities/Misc.).

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   Or call CompuServe with your modem. Set up your modem and telecommunications package using 7 data bits, even parity, 1 stop bit, and full duplex, and call (800) 346-3247. When the modem connects, press Enter. When you see the HOST NAME prompt, type in PHONES and then hit Enter. Then just follow the onscreen menus and note the access phone number for your area.
3. Dial the local-access number with a modem. When you connect to the network, press Ctrl-C to get its attention.
4. At the HOST NAME prompt, type CIS (which is the acronym of the CompuServe Information Service).
5. At the USER ID prompt, enter 177000,5300.
6. At the PASSWORD prompt, enter PC/CONTACT.
7. At the ENTER AGREEMENT NUMBER prompt, type 210DPCC1.
8. If you have trouble, call the Customer Assistance Line at (800) 848-8990. After you follow the above procedures, the CIS system will provide you with your own user ID—called a PPN—and a temporary password. You can then log on and begin to explore PC/Contact. In about two weeks, you'll receive a letter from CIS confirming your PPN and providing you with a new password. You should then change your password by typing GO PASSWORD at any CIS prompt.

TOP PICKS ON DISK

You can easily get all the public-domain utilities or shareware covered in this month's issue by calling the disk vendor Public Brand Software at (800) 426-3475 or (317) 856-7571. Ask for this month's Editors' Picks from *PC/Computing*. They're available for $5 or less per disk (most disks have several utilities and programs on them), plus $5 for shipping and handling. Visa and MasterCard are accepted.

For DOS And Windows!

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Remote Control Software

WHAT GOES ON BEHIND THE SCENES WHEN YOU ACCESS YOUR OFFICE PC FROM THE ROAD. **BY BOB BAYLEY • ILLUSTRATION BY TIMOTHY EDWARD DOWNS**

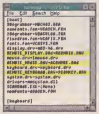
As its name suggests, Windows remote control software links a remote PC to another, called the host, and operates it from a window. For this to work, the host PC must be running a TSR that automatically answers incoming modem calls and accepts BIOS-level commands from the serial port.

1. Making Contact

When the remote PC dials the host, the modems exchange communications settings in a "handshake." The remote PC sends a data packet that identifies the call as an overture to remote control access and provides a caller ID and password. The host's TSR validates the ID and password against encrypted data in its security file. In some cases, the host calls back the remote PC at a designated number in its database as an additional security measure.

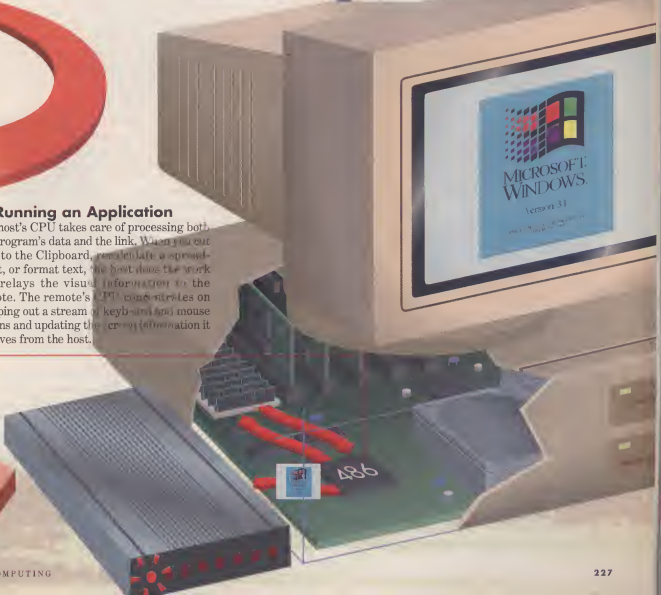
2. Loading Windows

The host now accepts commands via its serial port and relays its own status back to the remote. When you enter WIN, the characters enter the host's keyboard buffer via the serial port and load Windows. As Windows loads, secondary device drivers for the host's keyboard, video subsystem, and mouse also load from the host's SYSTEM.INI file. During remote access, these drivers yield control of Windows to incoming commands.



3. Priming the Remote PC

The host's secondary video driver sends shorthand instructions for duplicating its Windows screen to the remote PC. The frames, icons, fonts, and colors of a typical Windows screen contain around 130K of visual information, but the screen-drawing instructions sent across phone lines are typically less than 5K of code. The remote quickly updates the screen by caching its graphical elements in RAM.



4. Running an Application

The host's CPU takes care of processing both the program's data and the link. When you cut data to the Clipboard, recalculate a spreadsheet, or format text, the host does the work and relays the visual information to the remote. The remote's CPU concentrates on pumping out a stream of keyboard and mouse actions and updating the screen information it receives from the host.

AUTHORITATIVE ANSWERS TO YOUR MOST PRESSING PC QUESTIONS. BY DALE LEWALLEN AND JEFF PROSISE

386Max and VGASwap

I am an unabashed fan of 386Max and have been since the day I installed it on my system and baasted available canventianal memary to 628K. However, when my canputer baats, 386Max displays the message "RAM takes precedence over VGASwap . . . Press any key ta cantinue." While the message seems harmless, it is bothersame ta have ta press a key ta start my PC. Two questians: What is VGASwap, and what can I da ta eliminate the errar message?

JON M. TSUKUJI
SACRAMENTO, CALIFORNIA

VGASwap is a 386Max parameter that instructs 386Max to move the 32K of video ROM located at segment address C000h on many VGA and Super VGA systems to the B000h segment. This sometimes allows more TSRs and device drivers to be loaded high because it defragments upper memory, consolidating what would have been one noncontiguous upper memory block at segment B000h and another at C800h into one contiguous UMB starting at C000h.

The error message you describe means that your 386MAX.PRO file contains a RAM parameter whose address range excludes some or all of the space that VGASwap uses to move the VGA ROM. When such conflicts occur, the RAM parameter, which identifies areas of memory that 386Max cannot use, takes precedence. You can get rid of the error message by deleting the VGASwap parameter from the 386MAX.PRO file, or by modifying the RAM parameter to free up the address range B000-B7FF. For example, if the RAM parameter currently reads

```
RAM=A000-BFFF, D800-DBFF
```

modify it to read

```
RAM=A000-AFFF, B800-BFFF, D800-
    DBFF
```

One possible catch: If the VGASwap parameter contains numeric parameters that move the VGA ROM to a location other than B000h, it is that address range—not B000–B7FF—that you must exclude from the RAM parameter.

Always Room for Improvement

Your DOS Hat Tip "Make CD Change Directaries and Drives in One Cammand" (February, page 337) cantains a batch file that can be simplified substantially with DOSKEY macras instead af batch files. Instead af calling CDD.BAT via a DOSKEY macra named CD, yau can dispense with the batch file alta-

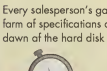
/// Help About . . . ///

HARD DISK SPECS

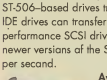
HELP! I'VE SPENT THE LAST COUPLE OF WEEKS SHOPPING FOR A HARD DRIVE, AND I'M UP TO MY EYEBALLS IN STATISTICS. WHAT'S THE DIFFERENCE BETWEEN ACCESS TIME AND SEEK TIME? WHICH OF THESE FIGURES IS MORE IMPORTANT TO KNOW?

CATHERINE PORTER
GENEVA, SWITZERLAND

Every salesperson's goal is ta make the gaads laak attractive, and hard figures in the farm af specifications and benchmarks always sound impressive. Here's a quick rundawn af the hard disk statistics yau're likely ta see and what each af them means.



Transfer rate If you ask na athar question of a hard drive vendor, ask far camparative data-transfer rates. This figure is the speed that data can move from the hard drive into the CPU. You'll hardly ever see it cited in ads, however, because it depends an the canfiguratian af the system in which it's installed. It really doesn't matter how fast the disk spins ar even how fast the heads move if there is a battleneck between the drive and the camputer system. Transfer rate is usually measured in megabytes or kilabytes per secand. Ta understand what port the interface plays in the transfer rate, consider that alder ST-506–based drives transferred data at less than 1MB per secand while modern IDE drives can transfer data at appraximately 1.5MB per secand. In contrast, high-performance SCSI drives can sustain transfer rates af up to 10MB per secand, and newer versions of the SCSI specificatoin call far data transfers appraaching 40MB per secand.



Average access time This number, measured in millisecands, is the ane usually cited in talk abaut disk performance. It is impartant ta knaw, but it's nat the mast telling figure. Access time indicates haw lang it takes the read/write heads ta mave ta a series af randamly selected tracks an the disk. It cambines twa factars: seek time (see belaw) and ratatianal latency. Seek times vary by design; ratational latency is directly linked ta the speed at which a disk spins. Most drives taday spin at 3,600 revalutians per minute and have a ratatianal latency of 8ms.

Average seek time Average seek time is similar ta average access time but less impartant. It measures anly the time required ta mave the read/write heads between twa adjacent tracks an the disk. A disk's average access time is a mare useful figure.

Mean time between failures This statistic is ane that drive vendars lave ta cite. It estimates the drive's likelihaad af foilure (nat its life expectancy). An MTBF af 250,000 haurs daesn't mean the drive has been tested far that lang—the technalagy is na mare than twa years ald, and this MTBF adds up ta 28½ years. Consider MTBF ratings anly as a measure af reliability, ar dan't consider them at all. Almast any drive fram a reputable vendar will last until your next upgrade.

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gether and make a DOSKEY macro called CDD:

```
DOSKEY CDD=$1: $B CD\ $B CD
  $2 $B CD $3 $B CD $4
```

To use this macro, simply enter CDD followed by the drive letter and the names of the directories you want to switch to:

```
CDD D WINDOWS EXCEL SHEETS
```

Using this approach preserves the old CD command, avoids using a batch file, and takes advantage of the speed of DOSKEY macros. This macro accommodates up to three subdirectory levels below the root directory. It also works correctly if fewer than three directory names are included or if only the drive letter is used. All you have to do is add more $B CD $*number* entries to the macro if you need more subdirectory levels.

MICHAEL GRAFF
ALEXANDRIA, VIRGINIA

Right you are, Mr. Graff. We're always happy to use a DOSKEY macro instead of a batch file—no matter how small the batch file might be.

Note: Case isn't important for the DOSKEY macro, but be sure to put a space between each parameter.

Shrinking Button-Bar Type

When I first installed WordPerfect 5.2 for Windows, the lettering in both the button bar and the status bar was clear and legible. For no apparent reason, the lettering recently became so small that I can hardly read it. I have reinstalled both Windows and WordPerfect for Windows—but to no avail. Do you have any idea what might have happened and what I can do to correct it? My video card is a 1MB ATI Ultra, which I run at a resolution of 1,024 by 768 pixels.

JAMES TRAVIS
GAINESVILLE, FLORIDA

It sounds as if you (or someone else) used Windows Setup to change to a small-font video driver.

Many Windows video drivers, including the ones that ship with the ATI Ultra card, come with two video drivers for each display resolution: one with small system fonts and one with large system fonts. Switching from a large-font driver to a small-font driver decreases the size of the text in many applications, and it may also shrink button bars and other graphical elements whose sizes are based on the size of the system font.

The solution to this problem is simple. Start Windows Setup, which you'll find in the Main program group, and select Change System Settings from the Options menu. Then pull down the Display menu and switch to a video driver that features larger fonts. For an ATI Ultra, you'll want to select the "1024x768 16/256 Normal" video driver. Re-

Challenge

PCContact

I BOOTED ONE OF MY PCs AND WAS GREETED WITH THE CHILLING LINE "PROBABLE NON-DOS DISK" ONSCREEN. MY SYSTEM HUNG, AND REBOOTING DIDN'T HELP. WHAT SHOULD I DO TO GET MY PC BACK IN SERVICE?

SALLY DRAKE
BIRMINGHAM, ALABAMA

Well, readers, how about it? What quick fix would get the system up and running? Drop us a line marked "August Challenge" to the address at the end of Q&A.

APRIL CHALLENGE SOLVED

Our April Challenge asked you to devise an intelligent batch file that would safely move files from one directory to another, being careful not to delete the files in the source directory if they weren't correctly copied to the target directory.

Several readers wrote to suggest DR DOS 6.0, which includes a MOVE command. The same is true of MS-DOS 6.0. We'd also like to point out that the reason many of you want to move files from one directory to another is simply to rename a subdirectory. If that's the only reason, consider our RENDIR utility that lets you rename directories without first copying files to the new directory and then deleting the old files. You can find RENDIR on PC/Contact in data library 1 (Hot Tips/Secrets) under the filename RENDIR.COM.

Our winner, Thom Riley of Schenectady, New York, was the first to submit a solution that safely copies a file or group of files from one directory to another. Use a text editor that handles ASCII files to create this batch file:

```
@ECHO OFF
REM MOVEM.BAT
ECHO F | XCOPY %1 %2 /V > NUL
IF ERRORLEVEL 1 GOTO ERROR1
ECHO Y | DEL %1
ECHO COPYIT has completed successfully.
GOTO END
:ERROR1
ECHO *** ERROR *** during %0, aborting...
:END
```

To move files with a batch file, use the XCOPY command and check the DOS errorlevel after the XCOPY command completes to see if it worked. Since the standard DOS COPY command doesn't set an errorlevel you can check, you risk unsuccessfully copying files to a destination and then deleting them from the source. In Mr. Riley's batch file, control transfers to the ERROR1 label if the XCOPY is unsuccessful.

In the second-to-last line, our winner had hard-coded the name of the batch file into the file. We used the %0 parameter, which returns the name of the actual batch file. That way, if you change the batch file's name, the error message will show it correctly.

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The common denominator of business around the world.

3M data cartridges require compatible drives. © 3M 1988

3M *Reliability*

start Windows to restore the original system font.

Download Recorder Macros?

In your May issue, you published an interesting tip that used the Windows Macro Recorder ("Autodialer for All Windows Applications," Hot Tips, page 248). I was finally able to record the macro, but not until I'd spent about 30 minutes struggling with the Macro Recorder's cussed ways. I notice that you've made same other utilities available on your PC/Cantact bulletin baard, so why dan't you upload the Recarder macra files there, too?

BOB WARMAN
WARWICK, RHODE ISLAND

Such timing! We thought the same thing you did and decided to do something about it. Starting this month, you'll be able to download Windows Macro Recorder files from PC/Contact, just as you can any other feature program or utility.

For starters, turn to the Windows Hot Tips column on page 214, or This Month's Free Software and Shareware on page 225 for information about the Windows Recorder macros that you can download. If you're not yet a member of PC/Contact, you can find complete information about how to join on page 225.

Escape from DOS's Editor

Before adding DOS 6.0 to my system, I used Edlin to create Escape cades that sent cammands to my LaserJet printer and to ANSI.SYS for creating prampts. With DOS 6.0, I na longer have that option. What alternative do yau suggest? The usual method—halding dawn the Alt key and tapping out 027 on the numeric keypad—doesn't work with EDIT.COM.

STUART THOMPSON
CHICAGO, ILLINOIS

It's a cinch. To enter any character that you can't enter by typing a key, press Ctrl-P, then hold down the Alt key and enter the character's three-digit ASCII code on the numeric keypad. To enter an escape code in a string of text, for example, press Ctrl-P, press and hold down the Alt key, type 027 on the keypad, and then release the Alt key. The escape character appears on the screen as a left-arrow symbol. Or (and this is much easier) press Ctrl-P, then press the Esc key. Like any keystroke, the Esc key is treated literally if it's entered immediately after Ctrl-P.

Double Your Prompts?

My PC does samething I've seen an no other PC—the baat process ends with three successive C: prompts. What causes this? Is it harmful? If sa, what can I do to prevent it?

TERRY G. KINNINGHAM
BONO, ARIZONA

Harmful, no; annoying, yes. The C: prompt is repeating because your AUTOEXEC.BAT contains extra carriage returns at the end. Call up the file in a text editor and delete the blank lines from the end of the file. The extra prompts should go away. Note that if the final command in the batch file is an ECHO command, you'll also need to delete the final carriage return at the end of the line. Another way to delete the extra prompts is to disable command echoing by adding an @ECHO OFF command to the batch file.

Windows Flash Cards

I'd like to learn DOS commands and other PC facts using the old "flash card" methad—with randam facts popping up far me ta memorize. I've experimented under Windows with putting Notepad in the Startup graup, but the random element is missing. Any ideas?

PAMELA D. RIDLEY
BATON ROUGE, LOUISIANA

We put together a little utility called WINMSG.EXE that should be exactly what you're looking for. Every time you run this Windows program, it reads a line at random from an ASCII file and displays it in a dialog box. The program comes with a sample file containing a complete list of DOS 6.0 commands.

Since this is a Windows utility and it uses a large text file, we can't reduce the code to a tiny DEBUG script—so you'll need to download the utility from our PC/Contact forum or order copies on disk from Public Brand Software (check the instructions in This Month's Free Software and Shareware on page 225). It's freeware, so we won't charge a license fee, and you can distribute it without restrictions.

To use WINMSG, first place it along with the text file WINMSG.TXT in your Windows directory. In Program Manager, pick a program group; select File, New, Program Item; and type WINMSG. Then click on the WINMSG icon. A dialog box will appear with a DOS fact. To see a message every time you boot into Windows, add WINMSG to Windows 3.1's Startup group (or in Windows 3.0, add a RUN=WINMSG.EXE command to the [Windows] section of WIN.INI).

WINMSG can throw any message at random on the screen. All you need to do is rename the current WINMSG.TXT to back it up and create a new one. A WINMSG.TXT file should be an unformatted ASCII text file that's no larger than 64K and that contains one message per line. It can contain up to 1,024 lines (any text beyond that is ignored); lines can be up to 512 characters long. The first line in the file becomes the window's title and should be no longer than 64 characters. As long as there are no blank lines anywhere in the file, you'll get a message every time.

If you like this utility, let us know of any more small Windows apps you'd like to see in PC/Contact. And let us know if you'd like sample WINMSG.TXT files on other subjects. We'll see what we can come up with.

Do you need help using your computer? Q&A provides practical advice on PC problems. Questions are selected on the basis of broadest interest and may be edited for clarity and length. Sorry, but we cannot answer questions individually. Send your question, along with any screen printouts or other details that could help solve it, to Q&A, Help, *PC/Computing*, 950 Tower Lane, 20th Floor, Foster City, CA 94404. You can also reach us via CompuServe, on *PC/Computing*'s PC/Contact online service. Send your comments or questions to 76000,21.

LET'S ALL GIVE EXCEL A BIG HAND.

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YOU'VE BEEN

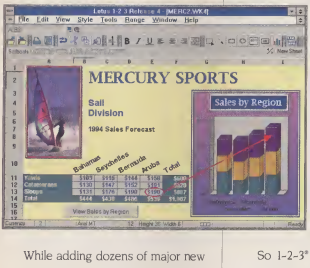
LOTUS INTRODUCES 1-2-3 RELEASE 4 FOR WINDOWS.

THIS IS CLEARLY A TIME OF CHANGE FOR AMERICAN BUSINESSES.

To keep up with these changes, business people need new and better-suited tools. Lotus* has responded by rethinking and re-creating the spreadsheet as a tool for individuals and for workgroups. 1-2-3 Release 4 incorporates over 4,000 spreadsheet user suggestions. It's dramatically easier to learn and use than any spreadsheet in history. And it's the first spreadsheet that's actually designed to help people work together in impressive new ways.

> *1-2-3 leapfrogs Excel and Quattro...*
> *–PC World 6/93*

IT'S MORE POWERFUL BUT VERY SIMPLE.



While adding dozens of major new features, hundreds of macros and hundreds of tools and @ functions, Lotus has actually simplified the way you work in a spreadsheet.

For example, Release 4 features an @ function pull-down menu to help you build spreadsheets faster. Cell copying is now a simple drag-and-drop operation, with meaningful visual feedback. And changing text and font attributes is done in one dialog box. (Excel often requires three.)

So 1-2-3* is not only a lot friendlier and easier to use than any other spreadsheet, it's a significant advance over Microsoft* Excel in usability.

THE FIRST CONTEXT-SENSITIVE USER INTERFACE.

> *The SmartIcons in 1-2-3 for Windows are smarter and Lotus' approach to swapping different tool-bars in and out beats Excel's and Quattro Pro's*
> *–PC Computing 6/93*

Release 4 actually anticipates what tools and functions you'll need. Depending on what you're doing, 1-2-3 presents only the menu choices and **SmartIcon**™ palettes appropriate to the operation at hand.

This means you won't spend time clicking through menus looking for the features.

IMMEDIATE ON-SCREEN MANIPULATION.

A **Live Status Bar** on screen

Automatic	Arial MT

shows the attributes of any highlighted element.

To make a change (like font, size or decimal points) you just click on the appropriate section of the status bar. Then scroll up to your chosen attribute and click again.

And unlike Excel, 1-2-3 R 4 includes **In-Cell**™ **Editing**, so you can enter and edit any information right in the cell.

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CING THE ACT WAITING FOR.

ONE-STEP CHARTING.

With **One-Step Charting**, you can pick up all titles, data, legends and axis labels right from the worksheet to create a great looking chart the first time, automatically. And you can edit the chart right in your worksheet.

NAVIGATE THROUGH 3 DIMENSIONS.

Anyone who works on multiple worksheets will appreciate the new 1-2-3 **Worksheet Tabs** which can be labeled with real words. So you can go directly to any sheet simply by clicking on the appropriate tab.

And Worksheet Tab names are then incorporated into formulas. All of which helps to keep 1-2-3's unique 3D technology simple and easy to use.

12 | Height 14 Width 9

DATABASE FUNCTIONS MADE EASY.

> *1-2-3 for Windows has always had more powerful database features than Excel or Quattro Pro, and now these features are also easier to use.*
> *–BYTE 6/93*

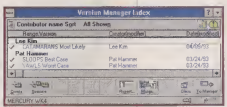
The 1-2-3 database now has a new, completely graphical interface that makes using it easier than ever. Plus 1-2-3 provides a range of built-in tools that are powerful without being perplexing.

For example, to modify or create a query, you don't generate criteria and output ranges with cryptic commands. Just bring up the Query Dialog Box and select the fields and records by name. Changing your query is as simple as drag-and-drop.

> *It (Version Manager) also makes Microsoft Corp.'s Scenario Manager in Excel 4.0 look like a toy by comparison.*
> *–PC Week 5/3*

THE FIRST SPREADSHEET FOR WORKGROUPS.

Have you ever forgotten why you used a particular number? Or wanted to track more than one value in a cell or range? Suppose you've sent a spreadsheet to a co-worker who develops a whole new version and sends it back? How do you integrate it into your work?



You use the **Version Manager**, that's how. It tells you who did what when, and why they did it. It lets you save, label, track, mix, match, merge and comment on ranges, worksheets or entire files. And it does it all without overwriting existing data.

If you have Lotus Notes® the workgroup benefits of the new 1-2-3 take on even greater proportions. Now different users can access and work on the same spreadsheet at the same time. Notes maintains file integrity and notifies you of changes made by others. So you know you're using the right numbers.

THIS IS THE BIG ONE.

Lotus 1-2-3 Release 4 is here. And it's the smoothest path from DOS to Windows.™ Plus, it's network ready. So one box is all it takes to upgrade all your users, whether they're working off a server or their own PC.

Call 1-800-TRADE UP, ext. 8969* for a free demo disk or to order your upgrade for just $119 direct from Lotus. Or visit your Lotus Authorized Reseller.

Lotus 1-2-3 Release 4
SPREADSHEET FOR WINDOWS

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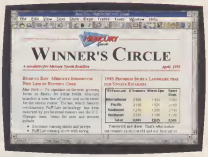
Ami Pro* 3.0 has been rated the number one word processor by virtually every critic and reviewer. Eclipsing both Microsoft* Word and WordPerfect.* If



Ami Pro is rated best word processor. Its tight integration with 1-2-3 Release 4 makes it even better

you're wondering why, there's no time like the present to find out.

Simply put, Ami Pro is a faster, easier, friendlier word processor to use. It produces such great-looking documents with so little effort, most people never even bother to open the manual.

Plus Ami Pro has the tightest integration with 1-2-3 Release 4. Features like shared Dictionaries, SmartIcons™ and a Live Status Bar make Ami Pro the best choice in word processors for 1-2-3 users.

BUY 1-2-3 RELEASE 4 AND GET FREELANCE GRAPHICS 2.0 FOR $129*

According to reviews and independent testing labs, there is no faster or easier way to create professional presentations than Freelance Graphics* 2.0. Its SmartMasters™ and one-click access to galleries of chart styles and symbols make it easy for anyone to make great color or black and white presentations in any format, including handouts. In the most recent Usability Sciences Corp. study, it took 64% less time to create a

*$129 direct from Lotus In Canada direct price is $159. Offer good until 8/31/93 or while supplies last. **Qualifying competitive products are Microsoft Excel Borland Quattro Pro (not including SE) Microsoft Word Wor Freelance Graphics Graphwriter and ccMail. ¶In Canada call 1-800-GO LOTUS. And please have your credit card and product package ready when you call. ††Demo disk only available for SmartSuite and 1-2-3 ©199 Lotus Organizer and SmartSuite are trademarks of Lotus Development Corporation. ccMail is a trademark of ccMail Inc., a wholly owned subsidiary of Lotus Development Corporation. Microsoft and PowerPoint are registered

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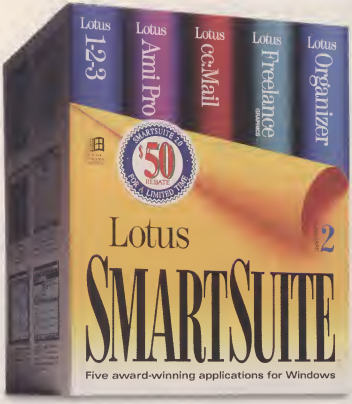
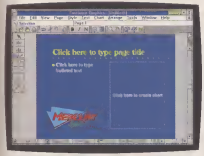


presentation with Freelance Graphics than with Microsoft Powerpoint.®

Like Ami Pro, Freelance offers Working Together™ capabilities with 1-2-3 and other Lotus applications that open up a whole new world of ease and usability. You can simply import a graph from 1-2-3 and it will arrive in your Freelance presentation, fully editable.



Freelance Graphics 2.0 is the easiest presentation software. With the new 1-2-3, if you update the spreadsheet, the presentation updates automatically

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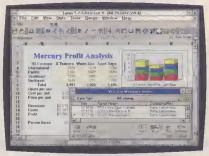

Once you're comfortable with one application, like 1-2-3, the common look and feel makes you right at home with all five

the Working Together Bonus Pack, a unique set of features designed to dramatically enhance the integration between Lotus Windows applications. This makes moving from application to application so quick and easy, and using functions from one application while working in another so natural, it feels like the entire suite is one piece of software. And there's absolutely no reason to settle for anything less.

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EXPERT TIPS AND TECHNIQUES FOR TAPPING INTO YOUR NETWORK'S HIDDEN STRENGTHS

DIRECTORY MAINTENANCE

RENAME ANY DIRECTORY

Want a quick way to rename subdirectories? NetWare's RENDIR command does what DOS can't—*and* it works on both local and network drives. DOS 6.0's new MOVE command doesn't work well with NetWare drives. Try to rename a subdirectory, and you'll get an error message. To properly rename a directory, enter RENDIR at a prompt followed by the directory you want to rename and the new name. For example, to rename FILES as DOCS, enter this line:

```
RENDIR FILES DOCS
```

RENDIR accepts paths, but you can't use this command to rename the current directory or move a directory.

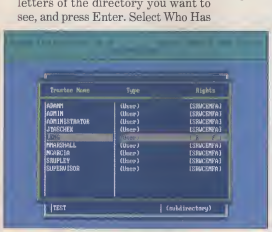
JOHN TASCHEK
ASSOCIATE TECHNICAL EDITOR

NETWARE ADMINISTRATION

SECURITY CHECK

To find out all users who have rights to a directory, use NetWare's FILER instead of TLIST, which doesn't show inherited rights that flow from parent directories. Log in as supervisor or equivalent and type FILER at a network prompt to call up a menu. Select Directory Contents, type the first few letters of the directory you want to see, and press Enter. Select Who Has Rights Here from the Subdirectory Options dialog box and press Enter. A list of users with rights to the selected directory appears.

GREG FORD
CLARITY TECHNOLOGIES



Scope out possible security violations. Use NetWare's FILER to see which users have rights to sensitive directories.

CUT KEYSTROKES ON MAPS

Cut long NetWare maps down to size by building from preexisting ones. For example, if you have a long path such as

```
MAP R:=SERVER1\SYS:SHARED\APPLS\
  EXCEL
```

and you want to add a map to the Excel macros directory, type

```
MAP S:=R:MACROS
```

Enter MAP by itself, and you'll see that the entire path has been mapped to the new drive letter.

This method also works backwards. To map the T: drive to another application on the APPLS directory, enter

```
MAP T:=R:...\WP51
```

The three dots indicate a two-step jump up the directory tree. You can move up directory trees by entering more than the two-dot DOS limit. This command changes to a directory three steps above the current one:

```
CD ....
```

JOHN TASCHEK
ASSOCIATE TECHNICAL EDITOR

QUICK MAPS

Don't waste time figuring out which drive letter to use for a network map. NetWare 3.11 has an undocumented feature that automatically assigns the next available drive letter to a map. It's useful when you're setting up a series of unique network drive maps for personal log-in scripts. To set a new drive map to a directory called UTILS on your SYS volume, for example, type the following command line:

```
MAP NEXT SYS:UTIL
```

NetWare searches the current maps and retrieves the first available drive. Don't worry if NetWare is already using the drive letters Y: and Z: as well as F:, because NetWare searches from the top down and makes G: the next available drive.

SCOTT WILMONT
900 SUPPORT

PERSONAL MENUS

QUICK PROGRAM ACCESS

Create menus for instant access to the programs you use most. NetWare provides a program that makes creating a custom menu as easy as writing a simple batch file. NetWare's menus are ASCII text files with the extension .MNU. To create a menu for your favorite NetWare utilities, log in to the network, open an ASCII text editor, and create a menu file called UTILS.MNU. Enter the title of the menu window flush left, preceded by a percent sign (%). Then list each menu item below the title (also flush left). Below each option, indent one space and list the corresponding command.

For example, this menu lists the most-used NetWare utilities:

```
%Favorite Utilities

1. Printer Control
     PCONSOLE.EXE

2. NetWare's File Manager
     FILER.EXE

3. Session Manager
     SESSION.EXE

4. Recover Lost Files
     SALVAGE.EXE
```

Though UTILS.MNU can be stored locally, you must have a search path to the menu program, located on SYS:PUBLIC (your Z: drive provided when you log in). To open the menu, enter this command in the directory where you saved UTILS.MNU:

```
MENU UTILS
```

Your menu opens with the list you typed in. To run a utility, select it and

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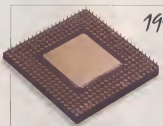

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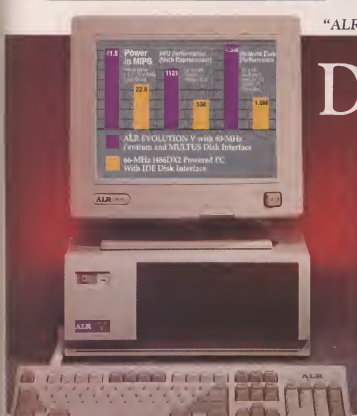

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hit Enter. As a shortcut, enter the first letter or number of the menu option to jump directly to it. To exit the menu, press Alt-F10, Enter. *Note:* Don't run Windows from a NetWare menu. Menus are TSRs that occasionally conflict with Windows.

JOHN TASCHEK
ASSOCIATE TECHNICAL EDITOR

TYPE INPUT INTO MENUS

Some NetWare commands are difficult to master. But it's a snap to create a network menu that prompts you for the right information at the right time. Whenever a command needs keyboard input, enter a parameter in place of the keyboard input with an @ sign and the number 1 (@1), followed by the user prompt in quotes. Repeat the process for the second parameter using @2, and so on. For example, add this to your menu to let anyone quickly transmit a message to someone else without having to remember the correct syntax:

```
Send a Message
    SEND "@1"MESSAGE"" TO
      @2"RECIPIENT"
```

The first line is the menu text and the next line is the menu command. When this menu item runs, it displays a MESSAGE prompt and waits for input. Then it displays the RECIPIENT prompt and waits for that data

JOHN TASCHEK
ASSOCIATE TECHNICAL EDITOR

FILE MANAGEMENT

PURGE FOR SECURITY

Do you have personal files stored on a network drive? They may not be as secure as you think, even if you delete them, because some networks can be configured to back up deleted files so that they can be copied onto a tape. Deleting a file doesn't totally erase it from your drive; it remains on the disk, even though it's invisible to you.

Ensure that your files are completely deleted with NetWare's PURGE, which erases the contents of deleted files from network drives and prevents them from being restored. Enter SALVAGE at a network prompt to check that you haven't deleted any files accidentally. At any network prompt, enter

```
PURGE /A
```

The /A tells the program to purge deleted files from the current directory and all subdirectories. Remove the /A to purge files from the current directory only. *Note:* You must have ERASE rights to run this program.

JOHN TASCHEK
ASSOCIATE TECHNICAL EDITOR

Do you get the best out of your network without calling tech support? Share your secrets. If we publish your tip, we'll send you $50. Send your tips, along with your name, address, and daytime phone number, to Networking Smarter, *PC/Computing*, 950 Tower Lane, 20th Floor, Foster City, CA 94404.

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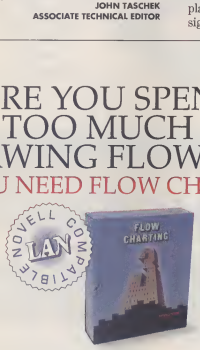

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Why Buy Direct?

Mail order offers much more than low prices—the real value lies in exceptional service and support.

BY DANIEL GROTTA

Henry Ford once said of the Model T, "You can have it in any color you want—so long as it's black." Years later, Ford relented and began offering the new Model A in red, green, and many other colors. Why the change? Car buyers wanted more choices, and if the Ford Motor Company wasn't willing to offer them, customers would buy elsewhere.

For years, the major PC manufacturers—IBM, Compaq, and Digital Equipment Corporation—sold their products exclusively through a network of company salespeople and authorized dealers. They dismissed the small but growing mail-order industry—usually referred to as the *direct channel*—as unimportant and even dis-

PC/COMPUTING DIRECT TOP 40

282	Advanced Logic Research	294	Expatech
282	Altec Technology Corp.	294	Gateway 2000
282	Ares Microdevelopment	300	Hyundai Electronics America
314	Arlington Computer Products	300	IBM PC Direct
282	Austin Computer Systems	300	Insight Distribution Network/Hard Drives Int'l
322	Bulldog Computer Products	300	Keydata Int'l
286	Compaq DirectPlus	304	Micron Computer
286	CompuAdd Computer Corp.	304	MidWest Micro
322	CompuClassics	324	Multiple Zones Int'l
286	Compudyne	304	Northgate Computer Systems
322	ComputAbility	304	PC Brand
286	Computer Discount Warehouse	324	PC Connection
292	Computer Sales Professional	310	PCs Compleat
292	Comtrade	310	Quantex Microsystems
292	Cornell Computer Systems	310	Sager-Midern Computer
292	Dell Computer Corp.	310	TC Computers
294	Digital Equipment Corp.	324	TigerDirect
322	Dustin Discount Software	314	USA Flex
324	Envisions Solutions Technology	314	Zenith Data Systems
294	Epson Direct	314	Zeos Int'l

reputable. But no more: All three companies now have aggressive direct channel divisions because that's how many of their customers want to buy computers, peripherals, and software. And some of the biggest PC suppliers—including Dell, Gateway 2000, and Zeos—trace their roots to and continue to operate as direct firms.

Today, 110 million Americans spend $50 billion a year through the direct channel. Lest you think that only a small slice of those sales involves PC products, think again: Approximately 35 percent of all hardware and 20 percent of all software sold in 1992 was purchased through that channel. The list of direct buyers is long and distinguished, and includes most every Fortune 1000 company, university, and government agency.

Garnering customers like these, the direct channel has grown rapidly in the past five years. And what keeps PC buyers coming back can be summed up in a single word: *value*. The sum total of what you get for your money exceeds what you can get from the local computer store or even a superstore. These advantages include larger selections of products, convenient shopping, extensive warranties, money-back guarantees, the latest technology, and comprehensive technical support. And the direct market offers all this at competitive or lower prices than alternative outlets—all instantly accessible by telephone.

• **Direct vendors aren't limited by available shelf space.** Unlike the typical computer store, direct vendors can offer a large variety of computer products from a single source. Many maintain large warehouses that contain inventories of thousands—or even tens of thousands—of items, compared to the the small sampling found in a retail store. Even retail superstores have to limit the brands and models of products, so if you've got your mind set upon a particular item or configuration you may have to special-order it.

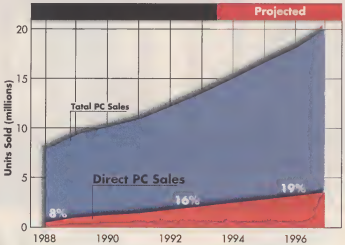
• **Locating a product and comparing prices and services in the direct channel via telephone is far simpler than driving from store to store.** Granted, you can also call around to retail outlets, but don't expect the undivided attention of the sales rep who answers the phone—the rep will probably have to put you on hold to check into your query or to serve the customers that are actually in the store. Moreover, you can shop the direct channel whenever it's convenient for you, since most vendors are open during the evening and on weekends. Better yet, you can call on their dime—just about every direct vendor features toll-free sales lines.

• **Direct vendors and name brands like IBM and Compaq buy parts and components from the same manufacturers, so hardware products purchased direct offer the latest technology.** For example, local-bus video was widely available in the direct channel early on and comes standard on most PCs purchased direct.

SAFETY IN NUMBERS FOR PC BUYERS

Unbeatable service fuels a steady rise in direct sales.

Sales of PCs through the direct channel have nearly quadrupled within the last five years. Direct vendors will continue to gain market share as more buyers discover the top-notch service.



SOURCE: INFOCORP

• **Most direct vendors offer parts-and-labor warranties of one to several years, and many provide one or two years of free onsite service.** Under these warranties vendors will ship replacement parts—often overnight—or send a technician to your business to repair the problem.

• **To help eliminate the uncertainty of buying through the direct channel, most vendors and manufacturers offer a no-questions-asked 30-, 45-, or 60-day money-back guarantee.** If a product doesn't suit your needs, send it back to the vendor for a full refund.

• **The quality of the direct channel's technical support surpassed that of retail outlets and superstores.** Most direct sellers maintain a well-trained technical staff, often available toll free. Some even feature around-the-clock telephone assistance, as well as fax lines, fax-back services, remote diagnostics, and bulletin boards.

• **Finally, prices are substantially lower through the direct channel.** Direct channel vendors don't have to spend big bucks on strategically located, elaborately furnished showrooms. And because of large sales volumes and intense competition, most direct channel manufacturers and dealers can sell closer to cost.

The bottom line is that the direct channel didn't grow as fast or get as big as it has without the support of millions of satisfied customers. Now that you're ready to join their ranks, read on and find out what it takes to be a savvy shopper in the direct channel.

Daniel Grotta is a Pennsylvania-based writer specializing in computer technology and buying issues.

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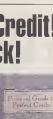

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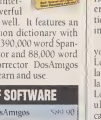

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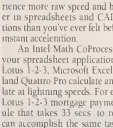

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These are all indicators of NOT ENOUGH MEMORY. If Windows doesn't instantly switch from one application to another — get more memory. Four MegaBytes is minimum, but I highly recommend 8MB.

How Do I Do It? Adding memory is really an easy process. If you can take the cover off your PC, you can add memory.

The first place to look is your PC's User's Guide. The Table of Contents should list a section on adding memory. Even if you don't have the manual, you can still do it. You only need 2 pieces of information: What type of SIMM (Single Inline Memory Module)? How Much Do I Need?

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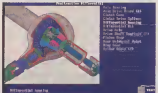

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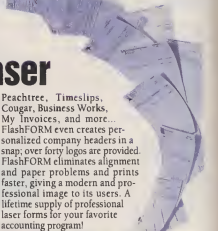

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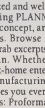

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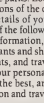

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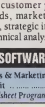

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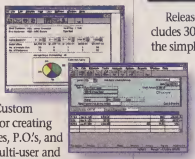

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Buy Smart

An insider's guide to getting the best products, prices, service, and support from the direct channel.

BY MARTY JEROME

Guaranteed satisfaction. Lifetime tech support. Hassle-free replacement. Toll-free 24-hour order lines. PCs perfectly suited to your needs. You want service? You've come to the right place. Direct merchants learned long ago that reliable service is their lifeline to repeat business buyers. In a market in which buyers shop among not a half-dozen stores in their geographic areas but hundreds of outfits nationwide, service is often the sole competitive advantage one direct vendor has over another.

That's good news for your business. Only three years ago buyers sized up a direct merchant by its selection of merchandise, its prices, its technical support, and its warranty and return policies. Today a smorgasbord of services—from multiple onsite repair options to extended warranties, multitiered volume discounts, and lease-to-buy options—enhance even simple purchases.

It's a mixed blessing, of course. Today, buying smart entails a complex series of decisions: You have to recognize not only the services you need—warranty, onsite service, tech support—but also what options you want within those services—a two-year parts-and-labor warranty, a year of free onsite service, 24-hour tech support. Given the number of vendors out there, services and

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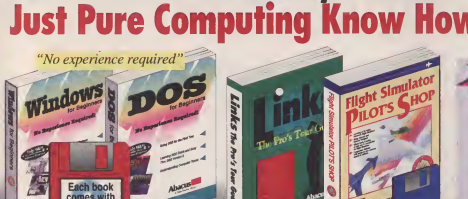

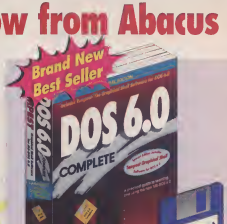

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options can be mixed and matched in all possible combinations, so you have to prioritize your needs.

Onsite repair, for example, is useless for most PC peripherals, since a technician will merely swap out the bad peripheral for a good one. Quite often, this requires several trips to your office extended over two or more days as the replacement is ordered and received. In effect, your repairperson becomes a go-between. Far more useful to most of us (and cheaper for the vendor) is a shipment policy that guarantees that the replacement peripheral will land on your desk within 24 hours, all initiated by a toll-free phone call. Swap it out yourself with less downtime.

On the other hand, businesses with small or nonexistant MIS departments can benefit greatly from services that were once the province of value-added resellers and consultants. For instance, buying multiple systems with the software preinstalled can save hours of installation time. So-called LAN-in-a-can solutions for small businesses—though sometimes not as simple to install as they're often billed—can save thousands of dollars that professionals would charge to bring simple connectivity to an office. Lease-to-buy options let you acquire the technology you need today without holding next year's budget for ransom.

Equally important in buying direct is knowing how much service your money actually buys. By making a direct vendor your sole supplier, for example, you can often negotiate volume discounts, shipping and restocking fees, software bundles, generous leasing deals, feature-packed systems not offered to less-preferred customers, and other extras. But sole suppliers also limit your options: A merchant that offers a wide variety of systems and servers may sell limited (and expensive) models of printers and network adapters.

There's no question that the plethora of service options brings business buyers more good news than bad. Making it work for you requires a little sleuthing; aggressive, roll-up-your-sleeves comparison shopping; and a strategic approach to your technology purchases. But first you need to size up the direct house you plan to do business with.

Size Up the Storefront

Roughly speaking, direct merchants fall into two camps: the manufacturing companies that primarily sell their own wares, such as Dell, Gateway 2000, Zeos, and CompuAdd; and the companies like Computer Discount Warehouse, CompuClassics, and PCs Compleat that sell national-brand products from Compaq, IBM, and Hewlett-Packard, among others. Like superstores, these companies offer a variety of product brands, but they're available via a toll-free number and come with a lot of extras (better service, for one) unavailable from superstores. Within this second camp of direct merchants are "specialty" stores that, because they narrow their focus to a type of product or technology, are more knowledgeable and therefore more valuable to certain PC buyers. A company called Envisions, for example, specializes in national-brand scanners and OCR software.

Which camp you trade with matters less than its management and solvency. Several insiders' tactics can help you make sense of these things in advance, beginning with the advertisement or catalog that first draws your attention to a company. After all, this is a direct vendor's store front. A little inspection is in order.

• **Mailing address.** Begin by looking for a full mailing address. If you see just a P.O. box, look for other evidence of stability and longevity in the ad, like claims of "more than five years in business," for instance. It pays to read the fine print.

• **Credit-card surcharges.** Look also for promises of no surcharges on credit-card orders. All merchants must pay these charges to credit-card companies—costs that ultimately get passed to you. The question is whether they're reflected in the advertised price of the product. If there's no mention of credit-card surcharges in the ad, ask about them the first time you call. Also beware of discounts for cash orders, which can save you as much as 15 percent. While ostensibly designed not to penalize you for credit-card surcharges, these may be signs

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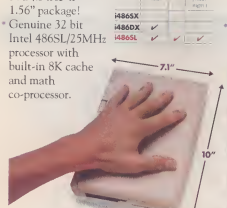

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Removable Hard Drive	Yes	No	No	No	No
RAM standard and maximum	1/20	4/16	1/16	2/4	1/4
PCMCIA Type II Slot	Yes	Yes	No	Yes	No
Backlit VGA Display	Yes	No	[illegible]	[illegible]	No (CGA)
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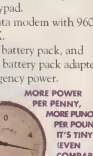

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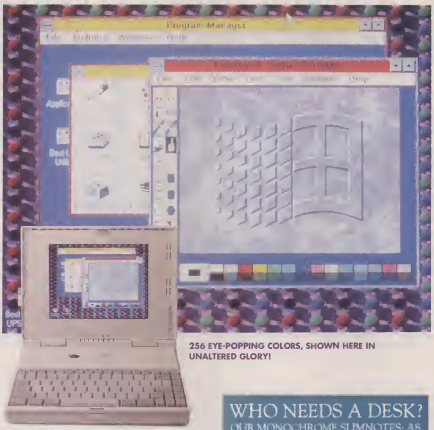

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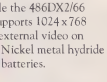

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of a weak cash flow. Find out more about the company if you suspect it's a fly-by-night operation. And unless you're paying COD, always put purchases on plastic. You can always stop payment if your purchase isn't delivered or arrives DOA, and some credit cards offer buyer-protection plans that can double your warranty if you pay with their card.

• **HEALTHY CASH FLOW.** There's no surefire way to gauge whether a company will be around a year from now, but a healthy cash flow is a darn good sign. This isn't always easy to discern. A steady advertising history by the direct vendor is one indicator. If you keep back issues of *PC/Computing*—or magazines that cater exclusively to direct buyers, such as *Computer Shopper*—look for consistent appearance of a merchant's ads. In particular, a company that takes out a 12-page ad one month but runs a single-page, black-and-white ad the next month might be suffering financial woes. Product shipments, though difficult figures to come by, offer an even better cash flow barometer, since they indicate the company has the capital needed to fill orders.

When buyers shop among hundreds of outfits nationwide, service is the sole competitive edge one direct vendor has over another.

• **SIZE OF PARTS INVENTORY.** The size of a direct merchant's parts inventory is another indicator of solvency. Inventories are expensive to maintain. If you inquire about the availability of a relatively obscure part, such as an extra serial port, a caching controller, or several unusual font cartridges for a laser printer, you can gain a sense not only of the company's cash flow but also whether you can conveniently obtain parts after you've made a purchase. Ask about overnight shipping; parts that take more than ten days to reach you have likely been ordered from a secondary supplier's inventory. For the delay, you get to pay a markup on the price.

SECRETS TO CORPORATE CLOUT

The Phantom Shopper shows you how to buy direct for your business.

Mast small-business awners cantinue ta think small when it cames ta shapping thraugh the direct channel. They feel they dan't have the budget—and therefore the daut—ta demand tap treatment fram established direct vendars. But the Phantom will tell you that smaller businesses can demand the same price breaks and credit terms as Fortune-size campanies da. Yau are the buyer, yau've got the maney, and anly yau can make the deal.

Get price breaks on the products you want, even if you're buying just one item at a time. Dan't like the price yau've been quated by a vendar? Make a caunteraffer. Nearly everyane I've talked to is willing ta negatiate, but yau have ta take the lead. One sales rep I talked to bluntly tald me, "If I can get away with it, I wan't give yau any discaunt." Be direct; for example, instead af saying "that's really a lat mare than I haped ta pay—can yau da any better than that?" try "yau'll hove ta da better than $1,499. I'd like ta da my business with yau, but I've been affered that printer far $125 less at ComputerMart. I need four printers and I'll pay $1,399 each."

Volume discounts don't necessarily require you to buy by the truckload. Mast mail-arder campanies affer valume discaunts. And ta same vendars "valume" starts at mare than ane unit. Others will alsa cansider yaur whale arder, nat just the valume af ane particular praduct. If yau have a number af things ta buy aver a relatively shart periad af time, cansider cansalidating them inta ane purchase. Yaur savings may mare than campensate far a shart-term cash flaw crunch.

You don't hove to be a Fortune 1000 company to qualify for a corporate account. Direct vendars will extend carparate accaunts ta businesses af any size, pravided yau pass a credit check. When applying far credit, ga inta the situatian with canfidence and be prepared. A camment like "hmm, I was wandering if I cauld qualify for credit" will shaw the vendar that you're nat sure af yaurself; always assume yau'll qualify. Yau'll need to pravide a bank reference and usually three trade references—campanies that yau da business with regularly. Ask the business/finance managers af thase campanies you have a good relatianship with to prepare a reference letter an yaur behalf, ar ask if they'd mind receiving a call fram a patential creditor. Apply for credit when yaur cash flaw is at "high tide." Yau'll have a hard time getting credit if yaur bank accaunt is running an empty—even if yau da have a lat af autstanding receivables.

If you dan't qualify far credit, you're still wise ta establish a relatianship with a single PC vendar. Return customers get better discaunts. Sales reps who knaw yau will extend better service and support. And you can establish credit with that vendar aver time by purchasing COD.

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Only NRI, the leader in hands-on training for 78 years, could give you training this complete, experience this practical. You actually build a powerful 486sx/25 MHz computer system — including an 80 meg hard disk drive — all the while gaining the hands-on skills you need to service today's sophisticated computers with confidence!

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NEW! Get inside a 486sx/25 MHz computer system ... and experience all the power and speed of today's computer technology!

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You need no previous background in electronics to succeed with NRI. You start with the basics, rapidly building on the fundamentals of electronics to master advanced microcomputer concepts.

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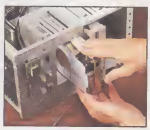

You install the 1.2 meg, 5-1/4" floppy disk drive, learning disk drive operation and adjustment. Later, you dramatically improve your computer's data storage capacity by installing a powerful 80 meg IDE hard drive.

You learn to quickly diagnose and service virtually any computer problem with the extraordinary R.A.C.E.R. plug-in diagnostic card and QuickTech diagnostic software included in your course.

NRI training is so complete, hands-on mastery is "built-in"

No other training — in school, on the job, anywhere — prepares you so thoroughly for today's money-making opportunities in computer service. And only NRI builds meaningful training around the kind of powerful computer system you'll be called on to service and repair in the real world.

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Now! Includes diagnostic hardware and software for quick, accurate troubleshooting

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Elite 486SX-25 Subnote

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Everyone loves our new line of Elite 486 Notebooks. Choose your Elite with an Intel 486SX-25, 486DX-33 or 486DX2-50 processor, select an active color, dual-scan color or monochrome screen and then pick the hard drive that best meets your needs—from 80 Mb up to 200 Mb!

No matter which processor, screen or hard drive you choose, your Elite 486 Notebook comes standard with 4 Mb of RAM and can be upgraded to 20 Mb.

Isn't it a relief to know that whether you're a teacher, doctor, lawyer, sales representative, student or homemaker, there's an Elite 486 Notebook perfectly matched to your needs...*and* your budget?

Statistics:

Processor:
Intel 486SX-25, 486DX-33 or 486DX2-50
RAM:
4 Mb, expands to 20 Mb
Hard Drive:
80 Mb, 120 Mb or 200 Mb
Screen:
10", 640 x 480 VGA resolution
Backlit display
Color - 256 colors
Monochrome - 64 gray shades
Battery Life*:
Active Color - 3 hours
Dual-Scan Color - 4 hours
Monochrome - 6 hours

Weight:
Color - 6.9 lbs.
Monochrome - 6.4 lbs.
512K Video RAM
86 keys with 101-key emulation
Built-in trackball
Built-in 1.44 Mb, 3.5" floppy drive
Advanced Power Management
One parallel and one serial port
External VGA and keyboard connectors
One PCMCIA Type III slot/ two Type II slots
***FREE* AC adapter and utilities disk**
***FREE* MS-DOS 6.0 installed**

486SX-25 Elite Notebooks

	Monochrome	Dual-Scan Color	Active Color
80 Mb	$1599 #005500	$2339 #005505	$3219 #005510
120 Mb	$1649 #005501	$2389 #005506	$3269 #005511
200 Mb	$1739 #005502	$2489 #005507	$3369 #005512

486DX-33 Elite Notebooks

	Monochrome	Dual-Scan Color	Active Color
80 Mb	$1869 #005515	$2599 #005520	$3489 #005525
120 Mb	$1919 #005516	$2659 #005521	$3539 #005526
200 Mb	$1999 #005517	$2749 #005522	$3629 #005527

486DX2-50 Elite Notebooks

	Monochrome	Dual-Scan Color	Active Color
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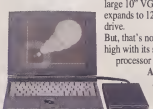
If you're looking for a powerful portable, the Elite 486SX-25 Subnote is a great catch. Weighing a mere 3.9 lbs., the 486SX-25 Subnote features a large 10" VGA screen, 4 Mb of RAM that expands to 12 Mb and up to a 200 Mb hard drive.



But, that's not all! The Elite Subnote scores high with its special Intel processor for low power consumption, Advanced Power Management and PCMCIA Type II slot for modems, flash memory, network adapters and more.

All this for under $1500? Only at MidWest Micro—so call us today and get your Elite Subnote for peanuts.

486SX-25 Subnote

Model	Item #	Price
80 Mb	005575	$1499
120 Mb	005576	$1549
200 Mb	005577	$1639

Statistics:

Processor:
Intel 486SX
Processing Speed:
25 MHz
RAM:
4 Mb expands to 12 Mb
Hard Drive:
80 Mb, 120 Mb or 200 Mb
Screen:
10", 640 x 480 VGA resolution
Backlit display
64 gray shades

Battery Life*:
5 hours
Weight:
3.9 lbs.
512K Video RAM
83 keys with 101-key emulation
Built-in trackball
External 1.44 Mb, 3.5" floppy drive
Advanced Power Management
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External VGA and keyboard connectors
One PCMCIA Type II slot
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At Your Service

Once you're confident that the company is stable, you'll want to know what kind of shopping service you can expect from it. To overcome consumer fears about the vagaries of buying technology through the mail, most direct vendors invest tremendous effort in training their sales teams. And it shows. For example, Dell, Gateway, and PC Brand, among others, require their sales teams to spend time on the assembly line. The typical direct sales representative—especially at companies that manufacture their own wares—is far better informed about technology than the person walking the sales floor at a superstore. Sales expertise does vary widely among direct merchants, however. Some know the technology inside and out, but others are less familiar with what they sell. They might be able to tell you that CorelDraw comes on CD, for example, but they can give only a few specifics about what each of the modules does.

Most direct vendors will let you set up a corporate account, even if your first purchase is only one PC or peripheral. If you need professional sales help, this is a great way to get it. (See "Secrets to Corporate Clout" on page 260.)

• GETTING THROUGH. Of course, this assumes that you can reach a sales representative in the first place. The near-universal use of 800 numbers doesn't guarantee immediate service. In the early stages of their success especially, both Dell and Gateway couldn't train sales representatives fast enough to keep pace with demand. It has been one of direct mail's paradoxes that the better the company's prices and/or technology, the harder it is to reach that company's sales staff.

The real test of a vendor's service, however, is getting through on a technical-support line. Better vendors provide toll-free numbers for tech-support as well as for sales. But because tech support is a cost center rather than a profit center, direct vendors often don't staff them as lavishly as their sales departments. Fewer technicians to take phone calls typically means longer waits for customers. On the other hand, shrewder merchants have discovered that their technical-support staff *is* a sales team, an engine for drumming up repeat business. Before doing business with a merchant, make phone calls to tech support at various times of the day to get a sense of the wait you can expect.

• WHO'S RESPONSIBLE? You'll also want to make sure that the product you plan to buy is covered by the direct vendor's technical-support center. With software, for example, you will almost certainly have to turn to the publisher for support, not the direct merchant. Before buying a package, call the software manufacturer to determine its technical-support policies. Hardware, on the other hand, should become the responsibility of your merchant, plain and simple. Even a direct house that resells national brands should support those machines. It's no less than you'd expect from an authorized dealer. You're inviting trouble if you presume that the manufacturer will supply technical support. Grill the sales representative about technical support before you proffer your credit card. Better yet, be sure to get all the details in writing; have your representative fax you the company's formal policy.

• HOURS OF OPERATION. The first thing to look for are the hours that the support center operates. The 24-hour, seven-day-a-week service that Dell, Zeos, and Insight provide has set the standard for direct vendors. Even companies like Gateway and PC Brand provide at least limited weekend hours and late-night hours during the week. This has proved a boon to business buyers who can't afford the downtime required to install a fax board, extra memory, or network shells during regular business hours. Small businesses, in particular, benefit from expanding, upgrading, and repairing their systems after hours.

• TERMS. You'll also want to check the terms of support. Fading from memory are the days when merchants offered the first year of support free, and then charged for every year after that. Better merchants offer free

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How accessible is your vendor's tech support?

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Technical-support options: Toll free Mon.–Fri. 8–6.	**Technical-support options:** Toll-free Mon.–Fri. 6–8, Sat. 9–5, Sun. 10–4; fax-back and BBS technical support.	**Technical-support options:** Toll-free 24 hours, 7 days a week for systems, software, and peripherals; fax-back technical support; BBS and online services such as CompuServe and Prodigy; remote diagnostics.
Warranty: 1 year; onsite support option.	**Warranty:** 2 years; 1 year free onsite support.	**Warranty:** 3 years or more; 2 years free onsite support.
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1Megx4	24 00	20 00	18 00	–
1Megx4 (Zip Pack)	25 00	21 00	19.00	–
256 x 4 (Video Zip)	–	–	15 95	12 95
256x4	4 75	4 50	–	–
256 x 1	3 00	2 60	2 20	2 00
64x4	–	–	3 00	–
64x1	–	–	–	1 50

INTEL Math Chips

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8087-2	69 00
0087-1	89 00
80287-XL	74.00
80387-16 DX	54 00
80307-20 DX	59 00
80307-DX (Does All)	89.00
Intel SX (Does All)	89 00
Intel SL Mobil	89 00
Intel 16SX	54.00

SIMM MODULES (Add $5.00 for SIPP)

	40NS	53NS	60NS	70NS	80NS	100NS
1Meg x 9	59 00	54 00	38 00	37 00	36 00	34 00
4Meg x 9	–	–	164 00	139 00	134 00	–
16Meg x 9	–	–	–	749 00	–	–
16Meg x 9 (9 chip)	–	–	–	1299 00	–	–
16Meg x 9 (36 chip)	–	–	–	699 00	–	–
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72 PIN SIMMS (EISA)

256 x 36 1Meg	EISA	–	–	–	50 00	–
512 x 36 2Meg	EISA	–	–	85 00	80 00	–
1 x 36 4Meg	EISA	–	169.00	159 00	149 00	–
2 x 36 8Meg	EISA	–	329.00	299 00	299 00	–
4 x 36 16Meg	EISA	–	619 00	609 00	599 00	–
8 x 36 32Meg	EISA	–	–	1475 00	1450 00	–
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AST MEMORY MODULES

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Advantage 12-306	4Meg Kit	500510-004		Call
Bravo 486/25, 33	2Meg Kit	500780-005		120 00
	8Meg Kit	500780-0D1		298 00
Bravo 406	2Meg Kit	500987-0D1		99 00
	4Meg	500987-002		159 00
	0Meg Kit	500907-0D3		310 00
	16Meg	500987-004		599 00
	32Meg Kit	500987-005		1200.00
Premium 386/25, 16 SX	1Meg	50071D-001		55 00
Premium 386/33	1Meg	500718-002		56 00
Premium II	1Meg	500780-003	WPB	6D 00
386SX20, 406-25, 25E, 33	4Meg	500700-004	WP8	149 00
Premium Tower, 386/33TE, 406/25TE, 486/33TE	8Meg	500780-001	WPB	298 00
Cupid Memory Board	0-32Meg	500818-001		Call

ZENITH MEMORY MODULES

MODEL	AMT. UPGRADED	AST PART #		PRICE
Z386/33, 25, 20, 33E	1Meg	ZA3800ME		50 00
Z386/33, 25, 20, 33E, 406/25E	4Meg	ZA3800MK		149 00
Z306SX	2Meg	Z-605-1	modules	99 00

MAGNAVOX

286/386SX-16, 386SX 20, 486SX-20 & 386-33
all are 72PIN SIMM
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0-8Meg Extended and/or Expanded Memory for all IBM P/S2 Models 50, 5DZ, 60, 5 SX, 65SX, 16 Bit, 4 0 LIM Compat
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IBM PS/2 SIMM MODULES

IBM PART NO.	WORKS WITH MODEL NO.	PRICE
30F5348 (512K)	30-286	30 00
30F5360 (2Meg)	30-286, 25-286, 50 MTHR BD	79 00
33G9288 (2Meg)	Thinkpad 300	109 00
33G9288 (8Meg)	Thinkpad 300	359 00
6450375 (1Meg)	80-041	79 00
6450379 (2Meg)	80-111, 311-121, 321, 081, 161	94 00
6451060 (4Meg)	80-A21, A-61, 80-A31, 80-111, 80-311	179 00
6450603 (1Meg)	35SX, 40SX, 55SX, Model-70's, P-70	45 00
6450604 (2Meg)	70-061, E61, 121, 50Z, 55SX, 65SX, P-70, 55LS, 65LS, X-Station 120 & 130, 35SX, 35LS, 40SX	74 00
6450608 (2Meg)	70-A21, A-61, B-21, B-61, 35SX, 35LS, 40SX Value Point 325T	79 00
78X8955 (128K)	25	35 00
34F2933 (4Meg)	35SX, 40SX, 55SX, 65SX, 55LS, 65LS	149 00
87F9977 (4Meg)	55SX, 55LS, 65SX, 40SX, 35SX, 35LS	149 00
1057035 (512K)	P/S1-286	40 00
92F9935 (2Meg)	P/S1 & P/S1/386SX-2121	84 00
92F9694 (4Meg)	P/S1 & P/S1/386SX, Model-2121	139 00
6450902 (2Meg)	56, 57, 57SX,90, 95, P-75, 57SLC Value Point 77 486DX2, 486SX, SVR 85	89 00
6450128 (4Meg)	57SX, 90, 95, P-75, 57SLC, 56, 56SLC, P/S1, 386SX, Models-2123, 2133, 2155, Value Point 77 4860X2, 486SX, SVR 85	149 00
6450129 (0Meg)	35SX, 40SX	299 00
6450130 (8Meg)	56, 57, 57SX, 90, 95 P-75, 57SLC Value Point 77 4860X2, 486SX, SVR 85	299 00
79F0999 (2Meg)	LX40, N33SX, PS Note	89 00
79F1000 (4Meg)	LX40, N33SX, PS Note	159 00
79F1001 (8Meg)	LX40, N33SX, PS Note	309 00
07G1826 (2Meg)	N51 (all)	99 00
07G1827 (4Meg)	N51 (all)	169 00
07G1828 (8Meg)	N51 (all)	309 00
07G1420 (4Meg)	CL57LSX LpTp, Thinkpad 700, 700C, 720, 720C	189 00
07G1421 (8Meg)	CL57LSX LpTp, Thinkpad 700, 700C, 720, 720C	319 00
92F8804 (2Meg)	N45SL	99 00

COMPAQ MEMORY MODULES

MODEL	AMT. UPGRADED	CMPQ PART #	PRICE
DeskPro 386/33, 386/33L,	2Meg Module	115144-001	89 00
486/25, 486/33L,	8Meg Module	116561-001	319 00
486/50L, System Pro	32Meg Module	116568-001	1500.00
DeskPro 386/33L, 486/33L	(Exp Bd)	116569-001	289 00
0eskPro 386/25, 386/20	1Meg Module	113131-001	79 00
	4Meg Module	113132-001	174 00
0eskPro 386S-16MHz	1Meg Exp 8d	113633-001	110 00
	4Meg Exp 8d	113634-001	219 00
	1Meg Module	113646-001	75 00
	4Meg Module	112534-001	174 00
DeskPro 386/20E	1Meg Exp 8d	113644-001	119 00
0eskPro 388/25E	4Meg Exp Bd	113645-001	219 00
	1Meg Module	113131-001	75 00
	4Meg Module	113132-001	174 00
DeskPro 286N, 386N,	1Meg Module	118688-001	50 00
386SX/20, 386/25M, 486/33M,	2Meg Module	118689-001	D5 00
486S/25M, 486S/16M	4Meg Module	118690-001	149 00
Port 486C	8Meg Module	128877-001	309 00
M Series Exp 8d	0-64Meg	129160-001	279 00
DeskPro 388/16	1Meg Kit	108071-001	99 00
	4Meg Kit	108072-001	269 00
	1-2Meg Exp Bd	108069-001	239 00
	4-8Meg Exp Bd	108070-D01	399 00
DeskPro 206	512K Kit	113012-001	59 00
Prolinea 386	2Meg	141738-D01	99 00
	8Meg	141742-001	299 00
Prolinea 486	1Meg	141602-001	55 00
	2Meg	141683-001	98 00
	4Meg	141664-001	159 00

COMPAQ LAPTOPS & NOTEBOOKS

	8Meg	141685-001	319 00
LTE/286	2Meg Bd	117081-0D2	99 00
LTE/286	4Meg Bd	117081-003	179 00
LTE/386S/20	4Meg Module	121125-0D2	179 00
LTE LITE/20, 25, 25C	4Meg Module	129769-0D2	179 00
LTE LITE/20, 25, 25C	0Meg Module	129769-003	319 00
LTE LITE/20 25, 25C	16Meg Module	129769-004	699 00
LTE LITE 4/25C	4Meg Module	142337-002	199 00
LTE LITE 4/25C	8Meg Module	142337-003	339 00
LTE LITE 4/25C	16Meg Module	142337-004	749 0D
SLT/206	1Meg Module	110235-001	79 0D
SLT/286	4Meg Module	110237-001	2D9 0D
SLT/386	1Meg Module	110303-001	79 00
SLT/386	2Meg Module	110304-001	99 00
SLT/386	4Meg Module	118305-001	169 00
Contura 320, 325	2Meg	139497-001	99 00
	4Meg	139498-001	169 00
	8Meg	139499-001	299 00
Contura 4/25, 4/25C, 4/25CX	4Meg	146520-001	219 00
	8Meg	146521-001	395 00
	16Meg	146531-001	939 00

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MODEL	PRICE	MODEL	PRICE
S-RAM Cards 1MEG	159 00	Flash Memory	Call
S-RAM Cards 2MEG	259 00	DTP	Call
Palm Modem™ 2400 *for HP LX*	Call	Ethernet	Call
Fax/Data ModemCard 9600/240D	279 0D	Token Ring	Call
Dptical Media Card	Call	3270 Emulation Adaptors	Call

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T2000/T2000SX	2Meg	PC18-PA8317U	75 00
T2000SX/T1000LE	4Meg	PC-PA8314U	149 00
T2000SX/T1000LE	8Meg	PC14-PA8315U	279 00
T2000SXE/2200SX/T1800, 1850, C	2Meg	PC-PA2000U	75 00
T2000SXE/2200SX/T1800, 1850, C	4Meg	PC-PA2001U	149 00
T2000SXE/2200SX/T1800, 1850, C	8Meg	PC-PA2002U	279 00
T4400SX, SXC T6400	4Meg	PC-PA2004U	164 00
T4400SX, SXC T6400	8Meg	PC-PA2005U	299 00
T4400SX, SXC T6400	16Meg	PC-PA2010U	599 00
T4400SX, SXC,T6400	32Meg	N/A	2599 00
T4500, T4500C	4Meg	PC-PA2012U	239 00
T4500, T4500C, T4600 (3 3 volt)	8Meg	PC-PA2013U	419 00
T3300SL	4Meg	PC-PA2007U	169 00
T3300SL	6Meg	PC-PA2008U	229 00
T3300SL	8Meg	N/A	369 00
T3300SL	16Meg	PC-PA2009U	749 00
T1200XE	2Meg	PC13-PA8306	85 00
T1600	2Meg	PC8-PA8302U	85 00
T3100	2Meg	PC3-PA7135E	129 00
T3100e	2Meg	PC9-PA834DU	85 00
T3100SX	2Meg	PC15-PA8308U	85 00
T3100SX	4Meg	PC15-PA8310U	164 00
T3200	3Meg	PC6-PA7137U	159 00
T3200SX	2Meg	PC12-PA8307U	85 00
T3200SX	4Meg	PC12-PA8909	164 00
T3200SXC	2Meg	PC19-PA8318U	84 00
T3200SXC	4Meg	PC19-PA8319U	164 00
T5100	2Meg	PC7-PA8301U	89 00
T5200/T8500	2Meg	PC10-PA8304U	89 00
T5200/T8500	8Meg	PC10-PA8313U	299 00

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ALR Venture	4Meg		229 00
AST Notebook Prem Exec 386SX/20/25/25L	4Meg	500814-003,	139 00
AST Power Exec 3/25C, 425EL	4Meg		179.00
AST Power Exec 425SL	4Meg		249 00
AST Power Exec 425SL	16Meg		1399 00
AT&T Safari NSX/20	4Meg	PEC 37651	189 00
Bondwell 8310, Plus	1Meg	23050-09100	109 00
Bondwell 8310V, SX	1Meg		109 00
Bondwell 8310V, SX	4Meg		219 00
Dell 212, 320N, 320N+	2Meg	310-3204	110 00
Dell 325N, 325NC	2Meg	310-3210	119.00
Epson NB3	4Meg	A808511	179.00
Epson NB/SL 20,25,25C	2Meg	A808771	129.00
	4Meg	A808781	219 00
	8Meg		479 00
Everex Tempo LX, LX20	2Meg	PCA 00053-0001	89 00
Everex Tempo Carrier	2Meg	PWA 0884-A-J000	119 00
Goldstar GS520 386SX/16	4Meg	S388-4M	239 00
Leading Edge 0/LT 386SX	1Meg		109 00
Magnavox Metalis	1Meg, 4Meg	286, 386SX	99.00,189 00
NCR 3170	4Meg	3123-K104-V001	239 00
NCR 3170	8Meg		519 00
NCR 3170	16Meg	3123-K116-V001	999 00
NEC Prospeed 286, 386SX-16	1Meg	PC21-21	105 00
NEC Prospeed 286, 386SX-16	4Meg	PC21-22	179 00
NEC Prospeed 386	2Meg	PC31-21	129.00
NEC Prospeed 386	8Meg	PC31-22	359 00
NEC Prospeed 386SX-20	1Meg	PC43-21	109 00
NEC Prospeed 386SX-20	4Meg	PC43-22	199 00
NEC Prospeed 486SX, SX/L	1Meg	DP-410-6204	Call
	4Meg	0P-410-6205	Call
NEC Ultralite III/20, 20P, 25C	2Meg	PC47-21	119 00
NEC Ultralite III/SL/25C	4Meg	PC47-22	219 00
NEC Ultralite SL/20, 20P	6Meg	PC49-21	289 00
NEC Ultralite III/25C	8Meg	PC47-23	349 00
NEC Ultra Versa	4 Meg/0Meg		299 0D/599 00
Packard Bell 386SX, 286	1Meg, 4Meg	2D6, 386SX	89 00,189 00
Panasonic CF170, CF270, CF370	1Meg	CF-BA165	54 00
Sanyo 17/18 NB	2Meg	MBC-NBMEM2	89 00
Sharp 6781, 6081, 6705	2Meg/4Meg		109.00/199 00
Sharp PC-6220	1Meg	CE 821B	85 00
Tandon, PC 8rand, Dataworld	2Meg, 0Meg	NB386SX-20	89 00, 499 00
TI Travelmate 2000	1Meg	2568034-00D1	85 00
TI Travelmate 3000	2Meg	2566996-1	79 0D
TI 4000	4Meg, 16Meg		199 0D, Call
Twinhead, Altima, Compudyne Tandy 4860, 486SX, DX	4Meg/16Meg		199.0D/999 00
Zeos 386SX Notebook	2Meg		89 00
Zenith Master Sport 306SX	2Meg	ZA-300-1	99 00
Zenith Master Sport SL, SLE	2Meg	ZA-4-4	09 00
Zenith Super Sport 286, 206E	1Meg	ZA-18D-66	09 00
286E, SX	2Meg	ZA-180-64	109 00
SX Alpha	2Meg	ZA-18D-86	109 00
SX Beta	2Meg	ZA-18D-87	109 00
Zenith Z-Note 325L, LC	2Meg/DMeg	ZA3250-4/-5	129 00/369 00

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AMOUNT UPGRADED	DK 8d	256k	1	2	3	3.5	4	5	6	6	16	32
Canon LBP4, 4Lite, 4plus	–	–	119	169	–	–	–	–	–	–	–	–
Compaq Pagemarq	–	–	69	991	–	–	169	–	–	299	Call	–
Epson 6D00, Action Laser	–	–	–	115	–	–	179	–	–	–	–	–
Epson Action Laser II	–	–	99	–	169	–	–	249	–	–	–	–
Epson 0000	–	–	99	–	169	–	–	249	–	–	–	–
Epson 1000	–	–	–	72	–	–	144	–	216	–	–	–
HP 2, 2D, 3, 3D, 3P, 2P 2P+	–	–	–	99	–	–	159	–	–	–	–	–
HP 4, 4M	–	–	–	0D	–	–	149	–	–	309	–	–
HP 3SI	–	–	49	–	–	–	139	–	–	309	–	–
HP 4SI	–	–	–	0D	–	–	149	–	–	309	–	–
HP Deskjet 500, 500C, 550	–	55	–	–	–	–	–	–	–	–	–	–
HP Paintjet XL3D0	109	–	–	–	–	–	268	–	–	–	745	–
IBM Laser 4019, 4019E	–	–	–	–	–	144	–	–	–	–	–	–
IBM Laser 4029	–	–	–	–	–	–	139	–	–	–	–	–
IBM Laser 4039	–	–	–	–	–	–	169	–	–	319	–	–
NEC 9D, 290	–	–	–	109	–	–	–	–	–	–	–	–
NEC 95	–	–	–	99	–	–	–	–	–	–	–	–
Dki 40D	–	–	–	94	–	–	–	–	–	–	–	–
Dki 83D, 84D	–	–	–	109	–	–	–	–	–	–	–	–
Packard Bell PB 9500	–	–	–	115	–	–	179	–	–	–	–	–
Panasonic 4420/4450I	–	–	–	119	–	–	109	–	–	–	–	–
Panasonic 4410/443D	–	–	–	109	–	–	189	–	–	–	–	–
Panasonic 4455	–	–	–	119	–	–	–	–	–	–	–	–
Panasonic 4450	–	–	99	–	–	–	–	–	–	–	–	–
QMS 410	–	–	119	–	159	–	–	249	–	–	–	–
Star LS04	–	–	109	159	–	–	249	–	–	–	–	–
Star Starscript 4	–	–	129	179	–	–	269	–	–	–	–	–
TI XL/PS17/PS35	–	–	49	–	–	–	–	–	–	–	–	–

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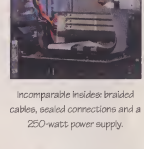

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lifetime support. Also, beware of vendors that offer premium technical support for a cost. Many of these guarantee that you won't wait on hold for more than two minutes or that technicians will help you install other vendor's peripherals in your system. To offer premium over standard support begs whether the glass is half empty or half full. Knuckle your salesperson to throw in the premium service at no extra cost at the time of your purchase. And remember to get it in writing.

The link between exemplary technical support and repeat business hasn't been lost on direct merchants. Many have adopted Dell's model of maintaining a database of every system they sell. Dial up Dell's technical-support line, and you'll be asked for your system number. The technician immediately knows the type of PC you have, the size of your hard drive, the video card installed, how much memory you've got, and other details. Support staffers can also browse through a history of problems you've experienced with the machine.

• FAX-BACK AND ONLINE SERVICE. Better direct vendors augment voice support with fax-back (or manual fax) service as well. As support goes, fax is only as good as the documentation you receive. Consider a simple chore: adding a second IDE hard drive to a system. It requires you to set the jumpers on both the master and the slave drives. The settings are much easier to illustrate graphically than to explain over the telephone. And because it's a very common upgrade, better direct vendors should be able to fax clear, graphical instructions to you. The same applies to installing an internal tape drive or adding SIMMs—all good ways to test a vendor's technical-support services before buying.

It's one of direct mail's paradoxes that the better the company's prices and technology, the harder it is to reach that company's sales staff.

Online technical support, either through the vendor's own BBS or through a forum on a national service like CompuServe or Prodigy, is also a good way to get the low-down on a product, especially since other users tend to be very candid about the vendor's or product's shortcomings. Fellow users also frequently come up with crafty workarounds to product glitches. Most important, online services provide the fastest, most efficient way for technical-support departments to send you bug patches and drivers.

Satisfaction Guaranteed?

Even the best technical support can't guarantee satisfaction. Sometimes a product simply must be returned, either because it's defective, because it doesn't live up to its promises, because you can't get it to work with your particular system, or because you decided you don't need it after all. These are rights that you should absolutely insist on—but insist on getting them in writing.

• WARRANTIES AND GUARANTEES. Don't even consider buying a hardware product from a merchant that doesn't provide at least a one-year warranty and a "no-questions-asked," 30-day, full money-back guarantee. Two-year warranties and 60-day refunds are even better. Software often doesn't fall under the same guidelines, since it's hard to resell once the shrink-wrap is off; the better direct companies will offer a 15- to 30-day money-back guarantee, but many offer none. Some force you to seek your refund from the software publisher. This in unacceptable. If your hardware merchant charges extra for either of these extended grace periods, try to get them for free as you negotiate the final price of your system. Feel free to break off negotiations if your representative refuses to budge. Nothing prevents you from calling back later.

In any case, look for both the warranty and the

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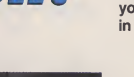

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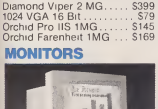

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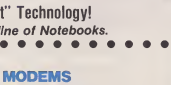

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money-back guarantee in the ad or brochure itself, then grill your sales rep for details. First and foremost, find out who honors the warranty—the direct merchant, the system manufacturer, or a third-party company. The one-year coverage advertised with a system, for example, might be the manufacturer's warranty. When a problem arises, you may have to get satisfaction from the manufacturer, which in turn may send you to its network of dealers. This is a common practice among resellers, for good reason; wouldn't you rather have your PC repaired by the company that made it than the company that simply sold it? Also make sure that your merchant replaces, rather than repairs, faulty components.

Shrewder merchants have discovered that their technical-support staff is a sales team, an engine for drumming up repeat business.

• RESTOCKING FEES. Likewise, "money-back guarantees" aren't necessarily 100 percent money-back guarantees. Restocking fees, in particular, are perfectly legal ways for the merchant to keep 5 percent to 20 percent of the original purchase price of returned merchandise. So are "handling" fees. Try to avoid doing business with companies that charge them—they're dying relics. And don't even think about doing business with a company that offers "store credit" only; you'll be hog-tied to wares you don't want or need.

If you find an irresistible product or price at a company that charges a restocking or handling fee, get specifics, preferably in writing. In particular, the percentage of the price charged should be figured before tax and shipping are added. Also, a merchant that charges a restocking fee on returned defective merchandise is swindling you.

• CONSUMER POLICE. If you feel that you've been defrauded, fleeced, or otherwise charged unfairly, you have several resources. Begin by filing a complaint with the Direct Marketing Association (212-768-7277). You should also drop a note to the Electronics Industries Association (202-457-4900) and to the Federal Trade Commission (202-326-2222). Finally, make sure the Better Business Bureau in the state where your direct merchant operates knows about your problem.

Air Mail

The same is true with shipping fees. When products appear dead on arrival, your direct merchant should pick up the tab both for its return and for sending you a new working model. Better merchants will send you the replacement by overnight courier as an act of good faith. In practice, you may have to negotiate this. Your chances are better if you ask your sales representative, rather than someone in customer service, to waive the fees. If you meet resistance, begin working your way up the food chain to a vice president of sales. Remind him or her that when a company charges consumers for defective merchandise, the deal smacks of fraud.

• OVERNIGHT EXPRESS. Most direct merchants can ship products to you by overnight carrier, though systems typically require at least two days to configure and burn in. You should have no problems getting peripherals and software overnight, if you request it. Many companies generally charge a flat fee to ship overnight, sometimes as little as $3 to $5. Also, forget about using the volume discount that your company uses with its parcel service; direct vendors almost universally refuse to use any courier except their own. Many offer a selection of three: U.S. mail, UPS, and any of several overnight carriers.

• INSURANCE. However you ship it, make sure your merchandise is insured during transit. Your direct merchant should pick up the cost of this, although you should likewise insure any merchandise you plan to return. Incidentally, never return anything to a direct merchant blindly. Always call customer service beforehand to ask for a return merchandise authorization (RMA) number. Shipping slips can track sent goods only to the door of your merchant's warehouse; RMA numbers provide an internal tracking number.

Talking Dollars and Cents

Once you're satisfied with a direct merchant's products and services, you should focus on price. Keep in mind that the more stuff you order, the more room you have to negotiate dollars. Unfortunately, as you whittle the price down, you also shrink your sales rep's commission. Needless to say, sales reps will resist negotiating in cold cash. Quite often, however, you can get your salesperson to sweeten the deal with "extras." More memory can almost always be put to use, as can a larger hard drive. Fax boards usually come bundled with truly awful fax programs; ask your rep to exchange it for a package of your own choosing. It's often easier for a salesperson to swap software bundles than to slice $100 off the price of a product. Take advantage of it.

But never forget service: extended warranty, same-day onsite service, and extended technical support. These are mainstays of the direct channel. They're every bit as important to your purchase as the size of your hard drive. And as intangibles, they're less susceptible to cost-specific controls. When you've pushed price and bundles as far as negotiations will allow, say to your salesperson, "Well, how about an extra year of onsite service?"

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4x9 $145
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HARD DRIVES

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CAPACITY	M/N	SPEED	SIZE	PRICE
IDE				
80MB	NOTEBOOK	15MS	3.5"	$280
120MB	NOTEBOOK	16MS	2.5"	390
150MB	NOTEBOOK	16MS	2.5"	490
30MB	ELS85A	12MS	3.5X1"	179
130MB	LPS120A	FAST	3.5X1"	300
127MB	ELS127A	17MS	3.5X1"	229
170MB	ELS170A	17MS	3.5X1"	300
340MB	LPS240A	FAST	3.5X1"	339
525MB	LPS525AT	FAST	3.5X1"	399
SCSI				
85MB	ELS85S	17MS	3.5X1"	190
127MB	ELS127S	17MS	3.5X1"	300
170MB	ELS170S	17MS	3.5X1"	300
340MB	LPS240S	FAST	3.5X1"	379
525MB	LPS525	FAST	3.5X1"	399
700MB	PD700	10	3.5"	1190
3.1GB	P1225	10	3.5"	1399
PLUS Hardcard EXL		80MB		294
PLUS Hardcard EXL		150MB		399
PLUS Hardcard EZ		240MB		549
PLUS Hardcard EZ		127MB		319

FUJITSU

FACTORY NEW – 5 YEAR WARRANTY

CAPACITY	M/N	SPEED	SIZE	PRICE
IDE				
330MB	M2622T	12MS	3.5"	$699
425MB	M2623T	12MS	3.5"	799
520MB	M2624T	12MS	3.5"	819
SCSI				
425MB	M2623FA	11MS	3.5"	899
520MB	M2624FA	11MS	3.5"	919
1.2GB	M2694SA	16MS	3.5"	1499
1.2GB	M2266SA	14MS	FH	1199
3.4GB	M2652SA	11MS	FH	1399
3.4GB	M2654SA	15MS	FH	2340

Maxtor

FACTORY NEW – FULL WARRANTY

CAPACITY	M/N	SPEED	SIZE	PRICE
IDE				
80MB	7080A	15MS	3.5X1"	$190
120MB	RS120A	15MS	3.5"	329
130MB	7131A	15MS	3.5X1"	209
215MB	7213A	15MS	3.5X1"	299
245MB	7245A	15MS	3.5"	319
340MB	LXT340A	15MS	3.5"	599
535MB	LXT535A	12MS	3.5"	879
SCSI				
130MB	7120S	15MS	3.5X1"	939
215MB	7213S	15MS	3.5X1"	399
340MB	LXT340S	15MS	3.5"	549
520MB	LXT535S	12MS	3.5"	399
540MB	MAGIK540	8MS	3.5X1"	1049
1.2GB	MAGIK1240	8MS	3.5"	1399
1.2GB	PO12S	15MS	FH	1199
1.7GB	P117	13MS	FH	1459

TOSHIBA

CAPACITY	M/N	SPEED	SIZE	PRICE
SUPERFAST SCSI 2				
577MB	MG438FB	13MS	3.5"	$899
1.4GB	MG538FB	13MS	3.5"	1239

MICROPOLIS

FACTORY NEW – 5 YEAR WARRANTY

CAPACITY	M/N	SPEED	SIZE	PRICE
SCSI				
340MB	MC1684	14MS	HH	$899
570MB	MC1624	14MS	HH	1399
1.2GB	MC2113	15MS	3.5"	1499
1.2GB	MC1596	15MS	FH	1399
1.5GB	MC1536	16MS	FH	1679
1.6GB	MC1596	11MS	FH	1749
2.0GB	MC1548	14MS	FH	1799
2.4GB	MC1634	11MS	FH	2379
3.0GB	MC1936	11MS	FH	3999

Seagate

CAPACITY	M/N	SPEED	SIZE	PRICE
IDE				
43MB	ST351	16MS	3.5X1	$199
107MB	ST31RB	15MS	3.5X1"	399
130MB	ST3144A	15MS	3.5X1"	399
240MB	ST3283A	12MS	3.5X1	399
SCSI				
240MB	ST3283N	12MS	3.5X1"	399
570MB	ST4766N	14MS	FH	1129
570MB	ST4767N	11MS	FH	1399
1.2GB	ST11200N	15MS	3.5"	1399
1.2GB	ST41200NK	14MS	FH	1199
1.6GB	ELITE-I	11MS	FH	1399
1.4GB	ST41651	14MS	FH	1749
2.1GB	ST42100N	14MS	FH	1399
2.4GB	ELITE-II	11MS	FH	2399
3.4GB	ELITE-III	11MS	FH	3999

WESTERN DIGITAL

FACTORY NEW – 2 YEAR WARRANTY

CAPACITY	M/N	SPEED	SIZE	PRICE
IDE				
80MB	WD280	15MS	3.5X1	$199
170MB	WD1170	15MS	3.5X1"	259
212MB	WD2200	12MS	3.5X1"	309
250MB	WD2250	15MS	3.5X1"	399
340MB	WD2340	15MS	3.5X1"	499

CONNER

FACTORY NEW – 1 YEAR WARRANTY

CAPACITY	M/N	SPEED	SIZE	PRICE
IDE				
40MB	CP3000	25MS	3.5X1"	$135
80MB	CP30084	19MS	3.5X1"	185
120MB	CP30104H	19MS	3.5X1"	215
170MB	CP30174E	17MS	3.5X1"	249
212MB	CP30204	12MS	3.5X1"	319
250MB	CP30254	14MS	3.5"	349
540MB	CP3544	12MS	3.5"	849
540MB	CP30544	17MS	3.5X1	CALL
SCSI				
80MB	CP30080	19MS	3.5X1"	199
170MB	CP30170	17MS	3.5X1"	279
212MB	CP30200	12MS	3.5X1"	329
540MB	CP3540	12MS	3.5"	869

MATH CO-PROCESSORS

INTEL		CYRIX		IIT	
8087 5MHZ INTEL	80.00	83D87DX-16 16MHZ CYRIX	84.00	2C87-8 8MHZ IIT	84.00
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8087-1 10MHZ INTEL	80.00	83D87DX-25 25MHZ CYRIX	84.00	2C87-12 12MHZ IIT	00.00
80287-6 6MHZ INTEL	49.00	3D87DX-33 33MHZ CYRIX	84.00	2C87-20 20MHZ IIT	84.00
80287-8 8MHZ INTEL	80.00	83D87DX-40 40MHZ CYRIX	94.00	3C87-16 18MHZ IIT	84.00
80287-10 10MHZ INTEL	89.00	83S87SX16 16MHZ CYRIX	74.00	3C87-20 20MHZ IIT	84.00
80287XL 10MHZ INTEL	75.00	83S87SX20 20MHZ CYRIX	74.00	3C87-25 25MHZ IIT	84.00
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OVERDRIVE SX/DX25	589.00				
OVERDRIVE SX/DX20	499.00				
RAPID CAD	290.00				

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4MB X 9-60NS SIMM	165	256K X 9-70NS SIMM	12	256K X 9-100NS SIPP	CALL
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1MB X 9-60NS 9 CHIP SIMM	38	1MB X 9-80NS SIPP	CALL	2 X 36 – 0MB	290
1MB X 9-53NS 3 CHIP SIMM	50			4 X 36 – 16MB	675
1MB X 9-53NS 9 CHIP SIMM	54				
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[illegible]

LOCAL BUS MOTHER BOARDS

386/486 ONE BOARD SOLUTION
386/486-64K Cache no CPU $200
386/486-256K Cache no CPU $250

386DX-33-64K CACHE W/CPU	$199
386DX-33-256K CACHE W/CPU	249
386DX-40-64K CACHE W/CPU	210
386DX-40-256K CACHE W/CPU	260
486SX-25-64K CACHE W/CPU	349
486DX-33-64K CACHE W/CPU	499
486DX-33-256K CACHE W/CPU	540
406DX-50-256K CACHE W/CPU	749

EXPANSION BOARDS

RAMpAT!™ Uses up to 10 MB of memory 16-bit ISA (PC AT) bus compatible. Self installing no switches or software setup required. Supports extended or LIM 4.0 expanded memory modes **$108**

RAMpAT!-Plus™ Up to 16MB of memory. Half-card plugs into 6-bit or 16-bit ISA expansion slots. Hardware support for LIM 4.0 expanded memory. Self installing software **$145**

AST Rampage Plus /2MB $169

DYNAMIC RAMS

1MB X 1-100NS	3.95	256 X 1-80NS	1.60	64K X 4-120NS	1.75
1MB X 1-00NS	4.20	256K X 1-70NS	1.80	64K X 4-100NS	2.10
1MB X 1-70NS	4.25	256K X 1-60 NS	2.20	64K X 4-00NS	2.25
1MB X 1-60NS	4.70	256K X 4-100NS	4.35	64K X 1-150NS	1.50
256K X 1-150NS	1.50	256K X 4-00NS	4.45	64K X 1-120NS	1.75
256K X 1-120NS	1.55	256K X 4-70NS	4.50	64K X 1-100NS	1.95
256K X 1-100NS	1.70	256K X 4-60NS	4.75		
1 x 4-00NS DIPP	21.00				

CACHE

8 X 8-15	9.00
32 X 8-15	18.00
8 X 8-25	4.00
32 X 8-25	7.00
64 X 4-25	9.00
16 X 4-25	8.00
8 X 8-20	4.00
32 X 8-20	8.00
64 X 4-20	10.00
16 X 4-20	8.00
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64 X 1-15	10.00
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128 X 8-20	CALL

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Fighting off the competition these days is getting harder and harder but TC has become unsurpassed by offering complete systems, paired with great service and support all at a price that can't be beat. All of TC's VESA Local Bus systems include an upgradeable path to the PENTIUM P24T Chip. Plus all systems now come standard with Microsoft DOS 6.0 and Windows. All systems and parts include a 30-Day no questions asked Money Back Guarantee with no RMA number needed (Freight is non refundable). In addition, if any part inside your system should fail within the TC warranty time frame, we will ship replacement parts to you via Federal Express overnight delivery at our shipping expense so you will be back in business in a flash. All systems are built in the U.S.A. in New Orleans, Louisiana and undergo a multitude of tests and re-tests before they leave our manufacturing plant, plus all of your COM Ports are labeled for you and you get a print-out of your three CMOS configurations screens so you can see exactly how your computer left TC. All this plus the track record of a company that has been in business since the mid 1980's should prove to you that TC Computers is your best and only choice for quality built, U.S.A. assembled, upgradeable computer systems.

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- 4M8 High Speed 70ns Ram
- 130MB IDE Hard Drive
- 1.2 or 1.44MB High Density Floppy Drive
- 101 Enhanced Keyboard
- Microsoft Dos 6.0 & Windows 3.1
- Microsoft Compatible Mouse
- 2 Serial, 1 Parallel and 1 Game Port

386SX-33	**$959**
386DX-40	**$999**
486SX-25	**$1099**

Student POWER Pak

Includes Printer & Free Software

- Intel 486 Processor
- 1MB 16.7 Million Color Video card
- 14" Crystal Clear Non Interlaced SVGA Monitor
- 4MB Ram (Desktop Case)
- 245MB IDE Hard Drive
- 1.2 & 1.44MB High Density Floppy Drives
- PFS Windows Works Version 2.0 Included Free (includes Word Processor, Spreadsheet, Database)
- Microsoft Dos 6.0 & Microsoft Windows 3.1
- Microsoft Compatible Mouse
- 2 Serial, 1 Parallel & 1 Game Port
- 24 Pin Dot Matrix Epson Printer & Printer Cable
- Laser Printer 4 Page Per Minute Option $459

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486SX-33	**$1599**
486DX-33	**$1699**

Multimedia POWER Pro

Complete with CD ROM, 16Bit Sound Card, 8CD ROM Titles, and VESA Local Bus Motherboard

- Intel 486 Processor
- 2 Slot VESA Motherboard w/128K Cache & 6 ISA Slots
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- 14" Crystal Clear Non Interlaced SVGA Monitor
- 4MB High Speed Ram 70ns
- 245MB IDE Hard Drive
- 1.2 & 1.44MB High Density Floppy Drives
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- Shielded High Powered Speakers
- CD Software Included: MPC Encyclopedia, Animals Reference Library, US Atlas, World Atlas, Monkey Island, Wing Commander & Chessmaster
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- 2 Serial, 1 Parallel and 1 Game Port
- Microsoft Dos 6.0 & Microsoft Windows 3.1
- Microsoft Compatible Mouse

486SX-25	**$1859**	**486DX-33**	**$2059**
486SX-33	**$1959**	**486DX2-66**	**$2259**

CAD & Graphics POWER Station

Complete with 17" Monitor, Viper VLB Video Card, and 540MB Hard Drive

- Intel 486 Processor
- 2 Slot VESA Motherboard w/256K Cache & 6 ISA Slots
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- Full Tower Case w/8 Drive Bays
- Diamond VIPER 2MB VLB Video Card
- 17" Viewsonic Non-Interlaced 1280x1024 Monitor
- 8MB High Speed 60ns Ram
- S40MB IDE Hard Drive w/256K Cache 10ms
- Promise Technology 2MB Caching VL Bus HD Controller
- 1.2 & 1.44MB High Density Floppy Drives
- Focus 9000 131 Key Programmable Keyboard
- Microsoft DOS 6.0 and Microsoft Windows 3.1
- Next Generation Genuine Microsoft Serial Mouse
- 2 Serial, 1 Parallel and 1 Game Port

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486DX2-50	**$3495**
486DX2-66	**$3595**

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- 8 Bay Full Tower Case
- Microsoft DOS 6.0 and Windows 3.1
- Next Generation Genuine Microsoft Serial Mouse

486DX-33 $2459

486DX2-66 $2659

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Complete with 400 Watt Power Supply & 1.3 Gigabyte Hard Drive

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- Zifi Socketed and P24T Ready
- Full Tower Case w/8 Drive Bays
- Heavy Duty 400 Watt UL Listed Power Supply
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- 14" Crystal Clear Non Interlaced SVGA Monitor
- 16MB High Speed 60ns Ram
- 1.3 Gigabyte SCSI 2 Hard Drive
- Eisa SCSI 2 Hard Drive Controller
- 1.2 & 1.44MB High Density Floppy Drives
- 101 Enhanced Keyboard
- Microsoft Dos 6.0 & Microsoft Windows 3.1
- Next Generation Genuine Microsoft Serial Mouse
- 2 Serial, 1 Parallel, and 1 Game Port

486DX-33	**$3695**
486DX2-50	**$3795**
486DX2-66	**$3895**

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2nd *Choose your hard drive and controller card.*

3rd *Choose the VESA Local Bus video card that you want.*

4th *Choose your monitor.*

5th *Choose the CD-ROM drive or CD-ROM Sound Card Bundle that you want.*

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- 2 Serial, 1 Parallel & 1 Game Port
- Microsoft Compatible Mouse
- Microsoft DOS 6.0 & Windows 3.1

1st CHOOSE YOUR BASE VESA LOCAL BUS SYSTEM

486SX-25MHz w/128K Cache Desktop Case	486SX-33MHz w/128K Cache Desktop Case	486DX-33MHz w/128K Cache Desktop Case	486DX2-50MHz w/256K Cache Full Tower	486DX2-66MHz w/256K Cache Full Tower
$699	$799	$899	$1059	$1199

2nd CHOOSE YOUR HARD DRIVE AND VESA CONTROLLER CARD COMBINATION

106MB Seagate Hard Drive 32K Cache 32-Bit VESA Local Bus IDEController	130MB Maxtor Hard Drive 64K Cache 32-Bit VESA Local Bus IDEController	170MB Conner Hard Drive 64K Cache 32-Bit VESA Local Bus IDE Controller	212MB Maxtor or Western Digital 64K Cache 32-Bit VESA Local Bus IDE Controller	250MB Maxtor or Conner 64K Cache 32-Bit VESA Local Bus IDE Controller
$200	$210	$240	$270	$300

3rd CHOOSE YOUR VESA LOCAL BUS VIDEO CARD

Cirrus Logic Chipset w/1MB VLB 16.7 Million Colors	STB Horizon VL 1MB 16.7 Million Colors	Diamond Speed Star Pro VLB w/1MB 16.7 Million Colors	Diamond Stealth 24 VLB w/1MB 16.7 Million Colors	STB Powergraph 1MB VLB 16.7 Million Colors
$95	$100	$115	$150	$150

4th CHOOSE YOUR MONITOR

TC 14" .28mm SVGA NI Monitor 1024x768	Viewsonic 14" V6 .28mm SVGA NI Monitor	Orchestra 15" .28 SVGA NI Monitor 1280x1024	Mag LX 1564 15" Non Digital SVGA NI Monitor	Viewsonic V6FS or Mag MX15F 15" SVGA NI Monitor
$290	$325	$410	$450	$550

5th CHOOSE YOUR CD ROM OR CD ROM & SOUND CARD BUNDLE

Phillips 205 CD Rom 350ms/150KB w/Adapter	Chinon CDS435 CD Rom 350ms/150KB w/SCSI Adapter	Texel 3024 CD Rom 280ms/300KB w/SCSI Adapter	Chinon CDS535K CD Rom 280ms/300KB w/SCSI Adapter	Philips 205 & Pro Audio Spectrum 16 Sound Card 350ms/150KB
$225	$340	$400	$450	$370

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The TC VESA Video Paks are by far our most popular systems. The reasons are simple, you get to choose the Base System YOU want. You get to choose the Hard Drive that you like. You get to choose the monitor and video card that you had your heart set on, and NOW you even get the option of choosing which CD ROM drive and/or Sound Board to go with all of it. Fill in the 5 prices below, one from each catagory (The CD ROM & Sound Card is optional) and you will have your total system price. It is that SIMPLE!!!

Fill In the Blanks To Get Your System Total

Base System	$_____	*1st*
Hard Drive	$_____	*2nd*
Video Card	$_____	*3rd*
Monitor	$_____	*4th*
Multimedia (optional)	$_____	*5th*
System Total	$_____	

VESA Paks

Now with Options for CD Roms & Sound Cards

340MB Maxtor or Conner 13ms 64K Cache 32-Bit VESA Local Bus IDE Controller **$400**	545MB Conner 10ms 256K Cache 32-Bit VESA Local Bus IDE Controller **$720**	CACHING HARD DRIVE CONTROLLER OPTION Promise Technology Caching VESA Local Bus Controller with 2MB RAM expandable to 16MB on board **Add $199**
Diamond Stealth Pro 2MB VLB 16.7 Million Colors **$320**	Diamond Viper VLB 1MB 16.7 Million Colors 1280x1024 **$310**	Diamond Viper VLB 2MB 16.7 Million Colors 1280x1024 **$380**	ATI Ultra Pro 2MB 16.7 Million Colors 1280x1024 **$450**
Viewsonic 15 15" .28mm SVGA NI 76Hz 1280x1024 **$600**	Viewsonic V7or Mag MX 17F 17" SVGA NI Monitor **$1000**	Viewsonic 17 76Hz 17" SVGA 1280x1024 Monitor **$1180**	Viewsonic 20 76Hz 20" SVGA 1280x1024 Monitor **$1900**
Texel 3024 & Pro Audio Spectrum Sound Card 280ms/300KB **$530**	Chinon CDS435 & Pro Audio Spectrum 16 Sound Card 350ms/150KB **$550**	Chinon CDS535K & Pro Audio Spectrum Sound Card 280ms/300KB **$660**	Toshiba CD Rom & Turtle Beach Professional Sound Card 200ms/330KB **$950**

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The PC/Computing

Direct Top 40

Our guide to mail-order vendors tells who's who, what they sell, and how they rate.

Researched and compiled by Christine Grech, Jozelle Cox, and Lydia Lee

You know what service and support options are important to you; now it's time to investigate which direct seller will make you a satisfied customer. To aid you, we've compiled a guide to 40 noteworthy vendors competing for your purchase in the direct channel. We'll tell you about their company histories, their specialties, their most popular products, special deals, and new offerings you should be on the lookout for.

Even more important, we've rated them on service and support as well as pricing. You can instantly see how they stack up against one another in the area that's most important to you. We arrived at our rating for service and support by awarding points for each service provided and subtracting points where a service we considered essential was missing. We evaluated shopping hours and services, technical-support hours and services, money-back guarantee and warranty policies. System manufacturers and system peripheral and software resellers were rated on different sets of criteria. Price scores reflect how vendors rated comparatively on a base system or on a standard shopping list of software titles and peripherals for May 1993.

This guide is by no means a comprehensive look at the burgeoning direct channel, but it highlights companies we're sure you won't want to miss.

If you've recently purchased a notebook computer

DO NOT READ THIS AD

Removable Hard Drive

Large Center Trackball W/ Palmrest

PCMCIA Type III Expansion Slot

Removable Keyboard Allows Easy Upgrades

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Powerful I486SL-25 3.3v CPU with Advanced Power Management for up to 4 hours of battery life.

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120MB Removable Hard Drive, easily upgrades up to 240MB

4MB RAM Fully upgrades to 20MB.

Unique Removable Keyboard, allows for instant upgrades

TravelPro 7500

Model/Display	Price
7500C Active Matrix	$3,495
7500M Monochrome	$1,975

Unsurpassed Variety & Value

TravelPro 5300 Series

Choice of Upgradable CPU's, i486SX-25, DX-33, DX2-50 and DX2-66 • Local Bus Video • Available in Active Matrix Color, STN Dual Scan Color & Mono Displays • Built-In Center Trackball • PCMCIA Type III • 4MB RAM Expandable to 32MB • Removable 60MB Hard Drive (120-240 avail) • Optional Internal Fax/Modem and Optional Desktop Docking Station

	Starting at
5325 Active Matrix Color	**$3325**
5325 STN Dual Scan Color	**$2350**
5325 Monochrome	**$1675**

TravelPro 4500 Series

Choice of Upgradable CPU's i486SX-33 or i486DX2-50 • Available in Active Matrix Color, STN Passive Color & Monochrome Displays • Built-In Trackball • PCMCIA Type II Expansion Slot • 4MB RAM Expandable to 20MB • 60MB Hard Drive (120-240 avail) • Optional Internal Fax/Modem

	Starting at
4533 Active Matrix Color	**$3550**
4533 STN Passive Color	**$2425**
4533 Monochrome	**$1825**

TravelPro 7300 Series

i486SX-25 • STN Dual Scan Color or Monochrome Displays • 25mm Built-In Center Trackball with Palmrests • 4MB RAM Expandable to 20MB • Removable 60MB Hard Drive (120-240 avail) • Removable Keyboard for Instant Upgrades • Optional Internal Fax/Modem

	Starting at
7325 Dual Scan Color	**$2185**
7325 Monochrome	**$1525**

ProBook Series

• 486-25 or 486-33 CPU • Built-In Trackball (Probook Ninty) • 10" 64 Grayscale Monochrome Display • Lightweight - Only 5.5 lbs • 4MB RAM Expandable to 8MB • 60MB Hard Drive (120-200 avail) • Optional Internal Fax/Modem

	Starting at
ProBook III - 486-25	**$1250**
ProBook IV - 486-33	**$1695**

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Because, if you just bought a notebook from one of the other guys, you might have missed a few things.

Like the incredible selection of features & options that are guaranteed to fit your exact mobile computing needs. Or the elegant look and sophisticated ergonomic engineering, designed to make your work not only easier but more enjoyable as well.

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LQ 570+ / 870	CALL
LQ 1070 / 1170	CALL
LQ 2550	CALL
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KX-P 2124 / with Color Kit	$299/$349
KX-P 2634	$359

NEC

Call for $250 NEC printer rebate!

Silentwriter M95, 6ppm Postscript	$1249
Silentwriter M95fx (M95 but with fax)	$1449
Silentwriter M97, 10ppm Postscript	$1489
Silentwriter M97fx (M97 but with fax)	$1729

STAR

NX-1001 Multifont	$135
NX-1040 Rainbow NEW	$159
NX-2420 Rainbow	$269
NX-2430 Black	$215
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MODEMS

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AFC 2400 Send96/Rec 48 RPI Int	$55
AFX 2400 Send 96/Rec 48 RPI Ext	$69
Zoom/FaxServer	$205
V 32 bis Send/Receive 14,400 for Win Internal / External	$179/$199
V 32 bis Send/Receive 14,400 for DOS Internal / External	$179 / $199
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Zoom 14 4 PKTExternal	$225
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SUPRA CORPORATION

SupraFaxModem Internal 24/96 NEW!	$53
Supra 2400 External	$59
SupraFaxModem 144LC, Class 1 only External DOS / Windows	$199 / $199
SupraFaxModem V 32 bis, Internal with FaxSoftware DOS/Win	$179 / $179
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with Fax Software, DOS	$239
with Fax Software for Win	$239
with Fax Software for Mac	$275

US ROBOTICS

Sportster 14 4 Internal / with Fax	$155 / $175
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NATIONAL SEMICONDUCTOR

Tyin 200 PC Communication Center fax, modem, voice mail recorder in a single board $179

MONITORS

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Panasync C1395, Non-Interlaced 28 DP, 1024 x 768	$419

CTX

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5468A, 14', 28DP1024x768, Inter	$269
5468Ni, 14", 28DP 1024x768, Non-Interlaced	$289
1560, 15', 28DP 1024 x 768, NonInter	$449
1760OF, 17' Flat, 31DP, 1280x1024, Non-Glare, Non-Interlaced	$819

SONY

CPD 1320 UC2, 14' , 640 x 480 VGA, 15 MM, includes Cables & Stand	$329
CPD 1430S, 14", 1024 x 768, non-interl , B514A, 25 MM, cables & stand	$589
CPD 1730S, 17',1024 x 768, non-interl , B514A, 25MM, cables & stand FREE DELIVERY	$1,039

NEC

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Altec Technology Corp. 1201 W. Foothill Blvd. Azusa, CA 91702 (800) 255-9971 (818) 969-2988 Fax: (818) 969-1238	Altec has been in the direct business for 8 years. Its current best-sellers include the 486 DX/33 Express System and the CAD Station. In addition to selling systems, Altec provides a repair-and-upgrade service for all PCs. Systems advertised as ready to ship are guaranteed to be delivered in 2 days. **Business hours:** Mon.–Fri. 7–7, Sat. 7–3. **Tech support:** Mon.–Fri. 8:30–4:30, Sat. 9–1; BBS, fax-back service. **Money-back guarantee:** 30 days. **Warranty:** 2 years parts, 1 year free onsite service.	☆ ☆ ☆ ☆	☆ ☆ ☆ ☆	☆ ☆ ☆ ☆
Ares Microdevelopment 23660-A Research Dr. Farmington Hills, MI 48335 (800) 322-3200 (313) 473-0808 Fax: (313) 473-4450	Ares has been selling PCs direct for more than 3 years and has been manufacturing computers for 10 years. All systems sold are EISA or VL-Bus and include monitors with built-in stereo speakers. Their best-selling product is the 486/66DX2 VL Bus system. Ares provides extremely comprehensive service, including 24-hour toll-free tech support and a 60-day money-back guarantee. **Business hours:** Mon.–Fri. 8 a.m.–11 p.m., Sat. 9–8, Sun. 11–5. **Tech support:** 24 hours, 7 days a week; BBS, fax-back service, remote diagnostics. **Money-back guarantee:** 60 days. **Warranty:** 2 years parts, lifetime labor, 1 year free onsite service.	☆ ☆ ☆ ☆	☆ ☆ ☆	☆ ☆ ☆ ☆
Austin Computer Systems 10300 Metric Blvd. Austin, TX 78758 (800) 752-1577 (512) 339-3500 Fax: (512) 454-1357	All of the systems Austin sells feature local-bus technology. Austin also markets a line of green PCs that meet the EPA's Energy Star program requirements. The Patriot PCs come bundled with Lotus applications. **Business hours:** Mon.–Fri. 9 a.m.–6 p.m., Sat. 10–5. **Tech support:** Mon.–Sun. 6–midnight; BBS. **Money-back guarantee:** 30 days. Restocking fee on special-order items. **Warranty:** 2 years, 1 year free onsite service.	☆ ☆ ☆	☆ ☆ ☆ ☆	☆ ☆ ☆ ☆

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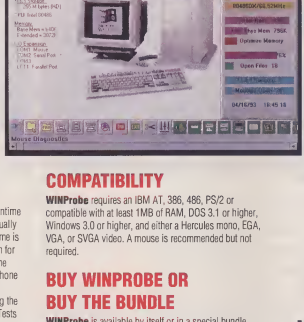

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Company	Profile	Service	Price	Overall Rating
Compaq DirectPlus 20555 State Hwy. 249 Houston, TX 77070 (800) 345-1518 (800) 888-5858	This PC heavyweight finally entered the direct channel this year. Compaq initially offered systems through a handful of other mail-order companies, including PC Connection, PCs Compleat, and Insight. But now Compaq is selling PCs and notebooks direct and has produced a catalog of its wares. Trade-ins are accepted on select Compaq, Apple, and IBM PCs. Software sold with the purchase of a system only. The 3-year warranty is one of the best around. **Business hours:** Mon.–Fri. 7–7, Sat. 8–12. **Tech support:** 24 hours, 7 days a week; BBS, fax-back service. **Money-back guarantee:** 30 days. **Warranty:** 3 years.	☆ ☆ ☆ ☆ ☆	☆ ☆ ☆	★ ★ ★ ★

Company	Profile	Service	Price	Overall Rating
CompuAdd Computer 12303 Technology Blvd. Austin, TX 78727 (800) 627-1967 (512) 250-1489	One of the early mail-order players, CompuAdd has been selling direct for 11 years. Its trademark catalogs come out about every 10 weeks, offering new products and promotions. Best-sellers include the Express line of PCs. **Business hours:** Mon.–Fri. 8–8. **Tech support:** 24 hours, 7 days a week; BBS, fax-back service, remote diagnostics. **Money-back guarantee:** 30 days. **Warranty:** 1 year, including free onsite service for most systems.	☆ ☆ ☆ ☆	☆ ☆ ☆	★ ★ ★ ★

Company	Profile	Service	Price	Overall Rating
Compudyne 15167 Business Ave. Dallas, TX 75244 (800) 862-3090 (214) 702-0055 Fax: (214) 888-5743	Compudyne is the PC manufacturing division of computer superstore CompUSA. Backed by the inventory of 50 retail stores, Compudyne can meet customer demands for best-selling products like the 4SL/25 Sub-note, 4DX2/66 Active TFT Color Slimline, and 4DX/33 VESA local-bus system. **Business hours:** Mon.–Fri. 7 a.m.–10 p.m., Sat. 9–5. **Tech support:** Mon.–Fri. 8–8, Sat. 9–4; BBS. **Money-back guarantee:** 30 days. **Warranty:** 1 year, including free onsite service for desktops.	☆ ☆ ☆	☆ ☆ ☆ ☆	★ ★ ★ ★

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- MS-DOS 6.0, Windows 3.1, Hi-Res Mouse
- Commute Remote Diagnostic Software
- Anti-Virus Software
- 2400 Baud Modem w/Send-Receive Fax
- 4 Mb RAM, 340 Meg Hard Drive

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- Multi I/O (2 Serial, 1 Parallel, 1 Game Port)
- MS-DOS 6.0, Windows 3.1, Hi-Res Mouse
- Commute Remote Diagnostic Software
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- 2400 Baud Modem w/Send-Receive Fax
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SYSTEM SPECIALISTS *(Continued)*

Company	Profile	Service	Price	Overall Rating
Computer Sales Professional 13 Clyde Rd. Somerset, NJ 08873 (800) 950-6660 (908) 560-1143 Fax: (908) 356-5005	Computer Sales Professional has been selling PCs direct for 4 years. It offers some of the best system prices we've seen. The C-Express delivery system provides shipping within 24 hours of your order, and you get a 45-day money-back guarantee to boot. **Business hours:** Mon.–Thu. 9–9, Fri. 9–6, Sat. 10–4. **Tech support:** Mon.–Thu. 9–9, Fri. 9–6. **Money-back guarantee:** 45 days. **Warranty:** 1 year, including free onsite service.	☆	☆	★
Comtrade 15314 E. Valley Blvd. City of Industry, CA 91746 (800) 969-2123 (818) 961-6688 Fax: (818) 369-1479	Comtrade has been selling direct for 5 years. It offers a complete line of PCs, including ISA, EISA, and VESA local-bus systems. The system prices are among the lowest around. **Business hours:** Mon.–Fri. 7–7, Sat. 9–6. **Tech support:** Mon.–Fri. 7–7, Sat. 9–6. **Money-back guarantee:** 30 days. **Warranty:** 2 years parts, lifetime labor.	☆	☆	★
Cornell Computer Systems 2019 Walnut Dr. Walnut, CA 91789 (800) 886-7200 (714) 594-5848 Fax: (714) 594-9995	Cornell's Rapid Response service promises that if a sales consultant fails to pick up your call within 90 seconds, you'll get an extra software program when you buy a system. New offerings include systems that are upgradable to Intel's local-bus standard, Personal Component Interface (PCI). Advertised configurations ship the same day they're ordered. **Business hours:** Mon.–Fri. 6 a.m.–7 p.m., Sat. 9–4. **Tech support:** Mon.–Fri. 7–7; BBS. **Money-back guarantee:** 30 days. **Warranty:** 2 years parts and labor, 1 year free onsite service.	☆	☆	★
Dell Computer Corp. 9505 Arboretum Blvd. Austin, TX 78759 (800) 289-3355 (512) 338-4400 Fax: (800) 727-8320	Michael Dell began selling computers by mail 9 years ago. His billion-dollar company now also offers a large selection of peripherals and software through the Dellware catalog. **Business hours:** Mon.–Fri. 7 a.m–9 p.m., Sat. 8–4, Sun. 10–3. **Tech support:** 24 hours, 7 days a week; BBS, fax-back service. **Money-back guarantee:** 30 days. **Warranty:** 1 year, including free onsite service.	☆	☆	★

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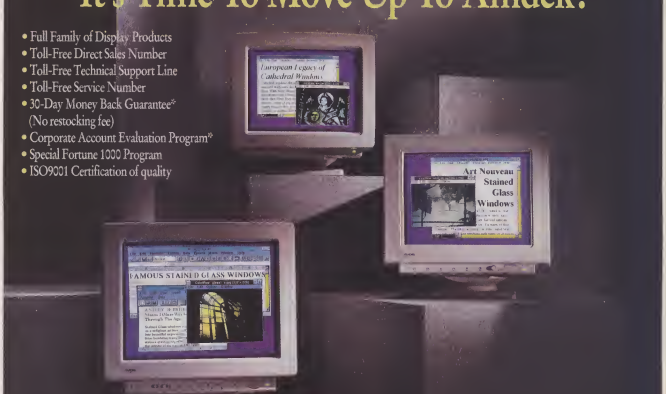

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Dot Pitch	—	.31mm	.28mm	.28mm	.28mm	.28mm	.26mm
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SYSTEM SPECIALISTS *(Continued)*

Company	Profile	Service	Price	Overall Rating
Digital Equipment Corp. 50 Nagog Park Acton, MA 01720 (800) 722-9332 (508) 493-5111 Fax: (800) 524-5694	DEC has been in the computer business for decades, but finally entered the direct channel with the debut of its Desktop Direct division last year. Best-sellers include the 486-based line of DECpc LPs. **Business hours:** Mon.–Fri. 8:30–8. **Tech support:** Mon.–Fri. 8:30–8; BBS, fax-back service. **Money-back guarantee:** 30 days. **Warranty:** 1 year, including free onsite service.	☆ ☆ ☆	☆ ☆ ☆	★ ★ ★

Company	Profile	Service	Price	Overall Rating
Epson Direct 20770 Madrona Ave. P.O. Box 2858 Torrance, CA 90509 (800) 374-7300 Fax: (310) 782-4455	Epson is one of the new players in the direct channel. The company sells the Endeavor line of PCs and offers a large selection of printers available only with the purchase of a system. External peripherals ordered with PCs are covered under Epson's warranty. **Business hours:** Mon.–Fri. 6–6. **Tech support:** Mon.–Fri. 6–6; BBS, fax-back service. **Money-back guarantee:** 30 days. **Warranty:** 1 year, including free onsite service.	**Company too new to rate.**		

Company	Profile	Service	Price	Overall Rating
Expotech 800 N. Church St. Lake Zurich, IL 60047 (800) 284-3976 (708) 540-8086 Fax: (800) 947-3976	Expotech manufactures most of the components that go into the systems it sells, and it's one of few vendors to offer a 3-year warranty. Modems are standard with all PCs and allow tech support to diagnosis your system remotely if necessary. Most systems ship the same day they're ordered. **Business hours:** Mon.–Fri. 7–8:30, Sat. 10–3, Sun. 10–3. **Tech support:** Mon.–Fri. 8–5, Sat. 10–5; BBS, remote diagnostics. **Money-back guarantee:** 30 days. **Warranty:** 3 years, 1 year free onsite service.	☆ ☆ ☆ ☆	☆ ☆ ☆ ☆ ☆	★ ★ ★ ★ ★

Company	Profile	Service	Price	Overall Rating
Gateway 2000 610 Gateway Dr. North Sioux City, SD 57049 (800) 846-2000 (605) 232-2000 Fax: (605) 232-2023	Gateway's competitively priced, high-performance systems have won *PC/Computing*'s MVP awards and made the *PC/Computing* list of the 200 top hardware products. But success has come at a price: Gateway is struggling to keep up with customer demand. Orders take an average of 2 weeks, and getting through to the toll-free tech support is often difficult. Gateway has been increasing staff in an attempt to minimize these delays. Peripherals, printers, and software are available only with the purchase of a system. **Business hours:** Mon.–Fri. 7 a.m.–10 p.m., Sat. 9–4. **Tech support:** Mon.–Fri. 6–midnight, Sat. 9–2; BBS, fax-back service. **Money-back guarantee:** 30 days. **Warranty:** 1 year, including free onsite service.	☆ ☆ ☆ ☆	☆ ☆ ☆	★ ★ ★ ★

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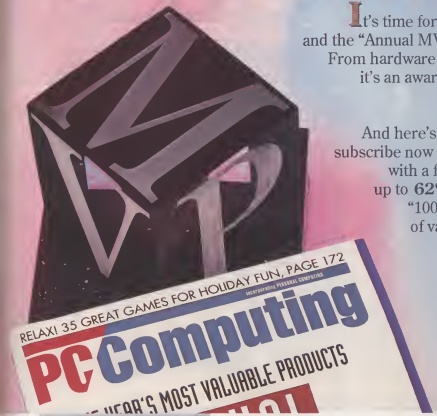

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545Meg	10ms	5400	256K	3 1/2"	CP30540	$749	$889
IDE							
42Meg	28ms	3557	8K	3 1/2"	CP3000	$143	$159
84Meg	17ms	3822	32K	3 1/2"	CP30084E	$175	$190
120Meg	18ms	3399	32K	3 1/2"	CP30104H	$189	$204
174Meg	17ms	3822	32K	3 1/2"	CP30174E	$209	$224
212Meg	12ms	4500	256K	3 1/2"	CP30204	$239	$254
251Meg	14ms	4542	32K	3 1/2"	CP30254H	$265	$280
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2060 Meg	12ms	5400	256K	5 1/4"	M2654ESA	$1999	$2139
IDE							
520 Meg	12ms	4400	64K	3 1/2"	M2624T	$725	$740

MICROPOLIS

5 Year advanced replacement Warranty

SCSI	Speed	RPM	Cache	Form	Model	Bare	AT Kit
667 Meg	16ms	3600	256K	FH	MC1588	$799	$938
1341 Meg	14ms	3600	256K	FH	MC1528	$1499	$1639
FAST SCSI -2 (10 MBytes per second)							
560 Meg	10ms	5400	256K	3 1/2"	MC2105	$869	$999
1050 Meg	10ms	5400	256K	3 1/2"	MC2112	$1069	$1199
1381 Meg	11ms	5400	256K	FH	MC1908	$1779	$1899
1748 Meg	14ms	3600	256K	FH	MC1548	$1729	$1869
2100 Meg	11ms	5400	256K	FH	MC1924	$2329	$2469
3020 Meg	11ms	5400	256K	FH	MC1936	$3049	$3189
IDE							
560 Meg	10ms	5400	256K	3 1/2"	MC2105A	$869	$884
1050 Meg	10ms	5400	256K	3 1/2"	MC2112A	$1069	$1084

Quantum

2 Year Warranty

SCSI	Speed	RPM	Buffer	Form	Model	Bare	AT Kit
85Meg	17ms	3600	32K	3 1/2"	ELS85S	$172	$312
127Meg	17ms	3600	32K	3 1/2"	ELS127S	$203	$343
170Meg	17ms	3600	32K	3 1/2"	ELS170S	$215	$355
245Meg	16ms	4306	256K	3 1/2"	LPS240S	$300	$440
IDE							
85Meg	17ms	3600	32K	3 1/2"	ELS85A	$170	$185
127Meg	17ms	3600	32K	3 1/2"	ELS127A	$199	$214
245Meg	16ms	4306	256K	3 1/2"	LPS240A	$295	$310

Seagate

1 Year Warranty

IDE	Speed	RPM	Buffer	Form	Model	Bare	AT Kit
43Meg	28ms	3600	8K	3 1/2"	ST351A/X	$125	$140
106Meg	15ms	3600	32K	3 1/2"	ST3120A	$165	$180
130Meg	16ms	3600	32K	3 1/2"	ST3144A	$185	$200
245Meg	12ms	4500	128K	3 1/2"	ST3283A	$289	$304
452Meg	12ms	4500	128K	3 1/2"	ST3550A	$489	$499

TOSHIBA

5 Year Warranty
Some competitors sell drives with a 3 year warranty. Please compare

SCSI-2	Speed	RPM	Buffer	Form	Model	Bare	AT Kit
877Meg	12ms	3600	512K	3 1/2"	MK438FB	$949	$1089
1230Meg	12ms	3600	512K	3 1/2"	MK538FB	$1089	$1229

Toshiba 200Meg 2 1/2"drives for laptop $399 IDE $569 SCSI (1 yr warranty on 2.5")

WESTERN DIGITAL

2 Year Warranty *
3 Year Warranty **

IDE	Speed	RPM	Buffer	Form	Model	Bare	AT Kit
170Meg *	12ms	3322	32K	3 1/2"	WDAC1170	$249	$264
212Meg *	13ms	3600	64K	3 1/2"	WDAC2200	$235	$250
256Meg **	12ms	3322	64K	3 1/2"	WDAC2250	$275	$290
341Meg **	12ms	3322	64K	3 1/2"	WDAC2340	$345	$360
425Meg **	12ms	3322	128K	3 1/2"	WDAC2420	$515	$530

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DRIVES 1-800-473-0923

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Maxtor Offers The Best Drive!
D.C. Drives Offers The Best Price!

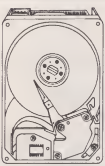
We will beat any advertised price on Maxtor drives!*

Maxtor drives offer the best value in hard disk drives on the market today. These drives are built to last. Over 7 million M7000 Series drives have been sold, giving you proven reliability. Maxtor won the 1991 IBM Custom Storage Solutions Quality Award for their outstanding reliability. They are the only drive manufacture to win this coveted award. Maxtor is so sure of the quality of their drives that they now offer the No Quibble Service Plan. If your drive fails during the warranty period they will ship you an advanced replacement.

IDE	Speed	Cache	RPM	Model	Form	Warranty	Bare	XT	AT
130 MB	15ms	64K	3600	M7131A	3.5"x1"	1yr	$199	$240	$215
170 MB	15ms	64K	3600	M7170A	3.5"x1"	1yr	$219	$259	$234
213 MB	15ms	64K	3600	M7213A	3.5"x1"	1yr	$235	$275	$250
213 MB	15ms	64K	3600	M7213A2	3.5"x1"	2yr	$249	$289	$264
245 MB	15ms	64K	3600	M7245A	3.5"x1"	1yr	$259	$299	$274
245 MB	15ms	64K	3600	M7245A2	3.5"x1"	2yr	$271	$311	$286
345 MB	14ms	64K	3600	M7345A	3.5"x1"	2yr	$339	$379	$354
New!							*Super Special Price!*		
540MB	8.5ms	256K	6300	MXT540A	3.5"x1"	2yr	$849	$889	$869

SCSI	Speed	Cache	RPM	Model	Form	Warranty	Bare	XT	AT
120 MB	15ms	64K	3600	M7120S	3.5"x1"	2yr	$209	$269	$349
213 MB	15ms	64K	3600	M7213S	3.5"x1"	2yr	$279	$329	$419
245 MB	15ms	64K	3600	M7245S	3.5"x1"	2yr	$289	$339	$429
340 MB	15ms	64K	3600	M7345S	3.5"x1"	2yr	$459	$519	$599
546 MB	8.5ms	256K	6300	MXT540SL	3.5"x1"	2yr	$849	$899	»$989
1045 MB	13ms	256K	3600	PO-12S	FH	2yr	$999	$1049	$1139
1240 MB	8.5ms	256K	6300	MXT1240S	3.5"	3yr	$1229	$1279	»$1369
1470 MB	13ms	256K	3600	P1-17S	FH	2yr	$1259	$1309	$1399
							WOW! 85¢ per meg!		

Maxtor drives a hard and fast bargain.



The Maxtor MXT540SL and MXT1240S are the **fastest** drives made! Specifications like Fast SCSI-2 Interface, 8.5ms seek time, 6300RPM spindle speed, and 256K cache buffer leaves the competition in the dust. Maxtor did not sacrifice quality to make these speed demons. They have a 300,000 hours MTBF (Mean Time Between Failures) that is more than 34 years of constant use.So if you have an application where you need the fastest drive available, you just found the drive your looking for at a great price.

DC Drives is one of the largest sellers of Maxtor drives in the world. Do you see any of our competitors with a full page advertizing Maxtor? The huge quantities of drives we sell allows us to get a great price on these drive. We pass these savings on to you. We guarantee the lowest price on Maxtor drives. If you see a better price we will beat it. If that is not enough we also want to offer you special discounts on other popular products when purchased with a Maxtor Drive.

Bundle Specials	Conner 250Meg Tape Backup (C250MQT)	$172
	Archive 2 Gig DAT kit to go with our SCSI hard drive kits	$919
	Archive 4 to 8 Gig *TURBO* DAT kit to go with our SCSI hard drive kits	$1239
	Toshiba XM3401B 200ms CD ROM kit to go with our SCSI hard drive kits	$439
	GSI 1533-21 High performance IDE controller	$48
	XtraDrive Disk Double Software	$18

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Circle 107 on reader service card.

COMPUTER MONTHLY READER'S CHOICE 1993 — Next Issue Bonus

COMPUTER MONTHLY READER'S CHOICE 1994 — Next Issue Bonus

COMPUTER MONTHLY READER'S CHOICE 1995 — Next Issue Bonus

COMPUTER MONTHLY READER'S CHOICE 1996 — Next Issue Bonus

Readers Give Their Vote Of Confidence For the 3rd Consecutive Year

DIRT CHEAP DRIVES

CD ROM DRIVES

Two Special Offers for DC CD Customers!
- Each CD ROM drive purchased from DC Drives includes a free $25 Coupon for Photo CD processing.
- With the purchase of any of our CD ROM Drives you may also purchase Kodak Photo CD Access Software & Photo Sampler (windows version) with a coupon worth up to $62 for Photo CD processing for only $25

Processing coupons are good for services from KO

MicroSolutions

Backpack External CD ROM Drive,
Plugs into Printer Port. 350ms, 128K buffer — $355

PHILIPS

CDD-521 External CD Recorder
- Includes 18Bit controller, Software, & 1 Disk.
- Feature rich software writes most formats.
- Call for complete details — $5499

Blank CD ROM Disks (by TDK)

TDK-CDW12	600Meg Capacity	1 / 10	$35 / $33
TDK-CDW12-EL	700Meg Capacity	1 / 10	$37 / $35

HiLite USA

HiLite CD ROM Drive kits feature the same Sony and Texel drives available from any other vendor.
These kits have 2 big advantages
Incredibly Low Price & 2 year warranty!
HiLite CD Bundle listed includes Word & US Atlas, Toolworks Encyclopedia, The Animals, Chessmaster 3000, & Typing Tutor.

SONY 2 Year Warranty!

- Model CDU-31A, 490ms, 64K Buffer.
- Multi-Session Photo CD, MPC, & XA Compatible.

Internal Kit with controller — $229
MultiMedia Kit with Media Vision Spectrum 16, Speakers, And HiLite CD Bundle — $395

TEXEL 2 Year Warranty!

- SCSI-2 Interface, 265ms, 64K Buffer.
- 300KB Data Transfer Rate. 1.5 MB/sec Burst Rate.
- Multi-Session Photo Cd, MPC, & XA Compatible.

Internal Kit with Trantor T130 controller — $419
MultiMedia Kit with Media Vision Spectrum 16, Speakers, & Mayo Family Clinic CD — $519
MultiMedia Kit with Media Vision Spectrum 16, Speakers, And HiLite CD Bundle — $539

CD ROM SOFTWARE

Get CD ROM Software at Special Discount Prices with the Purchase of Any of Our CD ROM Drives!

Bundle 1 $95
San Diego Zoo's The Animals, Grolier's Multimedia Encyclopedia, Toolworks World & US Atlas Pak, Toolworks Reference Library, Tempra Photo CD Access

Bundle 2 $79
Compton's Family Encyclopedia, Microsoft Bookshelf, Languages of the World, National Geographic Mammals, Mixed-up Mother Goose, World Atlas

Beauty & the Beast	$32	Bible Library	$23
Business Atlas	$20	Carmen San Diego	$34
Chessmaster 3000	$35	CIA World Fact Book	$23
Dictionary of Living World	$45	Dinosaur Adventure	$41
Electronic Home Library	$25	Encyclopedia	$52
Family Doctor	$35	Game Pak	$19
Grolier Encyclopedia	$59	Guinness Record Book	$35
Languages of the World	$32	Library of the Future	$59
Mayo Clinic	$28	Monkey Island	$26
Phoenix CD	$19	Pulaski II	$25
Q and A	$46	Reference Library	$29
San Diego Zoo Animals	$35	US Atlas w/ Automap	$29
US History	$32	Atlas Pak (World & US)	$23

CD Software not sold seperately only with CD ROM Drives

TEXEL

- **SCSI-2 Interface, 265ms, 64K Buffer.**
- **300KB Data Transfer Rate. 1.5 MB/sec Burst Rate.**
- Multi-Session Photo CD, MPC, & XA Compatible.

Bare / Bare External with case	**$365 / $449**
8Bit Internal Kit / External Kit	**$429 / $539**
16Bit Internal Kit / External Kit	**$519 / $619**
MultiMedia Bundle MMB2 Int. / Ext.	**$969 / 1079**
PS/2 External Kit	**$639**
MacIntosh External Kit	**$529**

PIONEER 6 Disk CD ROM Changer

DRM-600A
- 600ms, 153KB/sec Data Transfer

DRM-604X
- 300ms, 612KB/sec Data Transfer (Fastest Data Transfer Rate Available with Pioneers Quadraspin)
- Multimedia, CD XA, & Kodak Photo CD Compatible.

	600A	604X
Bare External	$839	$1249
8Bit External Kit	$989	$1339
16Bit External Kit	$989	$1449
PS/2 External Kit	$1029	$1489
MacIntosh External Kit	$889	$1299
Extra 6 Disk Magazines	$22	

In Touch with Tomorrow

TOSHIBA

Fastest Available!

- **XM-3401, SCSI-2 Interface**
- **200ms, 256K Buffer.**
- **330KB Data Transfer Rate.**
- **1.5 MB/sec Burst Rate.**
- **Kodak Multi-Session Photo CD, CD XA & MPC Compatible.**

Unparalleled speed and reliability set the 3401 CD ROM apart from the competition. Featuring fully integrated audio, the double speed drives, which are MPC compliant and support Multi-Session Kodak Photo CD, meet today's demanding requirements for CD ROM applications.

Multi Media Kit includes
SALE!
Internal $649 — Media Vision Pro Audio 16, XM-3401 Drive
External $779 — Media Vision Driver Software, Data and Audio Cables
Add $30 for Studio 16

Bare / Bare External with case	$449 / $565
8Bit Internal Kit / External Kit	$509 / $629
16Bit Internal Kit / External Kit	$579 / $699
PS/2 External Kit	$719
External for IBM SCSI Controller	$699
Printer Port Ext. Kit (T338) / (T348)	$689 / $725
MacIntosh External Kit	$609
External Multiple CD ROM Drive Stacks	
2 Drive / 4 Drive / 7 Drive	$1029 / $2199 / $3929
External Battery Powered Unit (with battery)	$719
Battery Powered unit with T348	$879

CD ROM ACCESSORIES

CREATIVE LABS

Sound Blaster Pro Deluxe
Built in 40pin CD ROM Interface, Includes Lemmings, Indianapolis 500, & Toolworks MPC Encyclopedia — $134

Sound Blaster 16 ASP
True 16Bit Stereo Sound, 40pin CD ROM Interface, free microphone — $224

MEDIA VISION

Pro Audio Spectrum 16
16Bit Sound Board with SCSI CD ROM Interface — $179

***NEW!* Pro Audio Spectrum Studio 16**
Sound board & Voice Recognition for your PC, Free Microphone, & SCSI CD ROM Interface — $209

SONY Speaker Systems

SRS-58 3watt/channel shielded speakers — $95
SRS-D2K 3pc. w/ subwoofer, 20watt total, shielded — $159

Bundle Specials (Price with purchase of CD ROM Drive)
Caddies $6 — Speakers $19

OPTICAL DRIVES

Internal and external prices include controller, driver software, manuals, and one disk. Most operating systems supported. Call for PS/2, Mac, Sun, Local bus & EISA kits. We are very experienced with optical and offer THE BEST Price ◆ Product ◆ Selection ◆ Sales & Technical Support. All Types : Optical, MO, WORM, and Jukebox drives. All Brands : IDE, Kodak, Laser Magnetics, Pinnacle, Most, NKK, Panasonic, Pioneer, Sony, and others.

FUJITSU

M2511A - Fastest 3 1/2" 128meg drive available!
- 30ms, 3600RPM, 3 1/2" x 1" high drive.

Bare Drive Internal / External — $859 / $999

Special Kit Price with 4 Disks & Controller $979

HEWLETT PACKARD

HP Optical drives are available in a wide variety of jukebox forms.

C1716C/F - **The Best 5 1/4" 650Meg available!**
- 27ms, 3600RPM, 5 1/4" Full High.
- This is a Multifunction drive. Use rewritable or WORM (Write Once Read Many) media.

Bare Drive	Internal / External	$2199 / $2399
16Bit Kit	Internal / External	$2559 / $2759
10.4Gig external jukebox		$6999

PRODUCT FOCUS

***NEW!* 1.3Gig Multifunction drive**
1.3Gig is the new industry standard capacity. This drive will also read 650Meg cartridges. The performance of this drive is incredible. Rotation speed 3600RPM, 23.5ms, 512K buffer gives a 14ms effective access. Other features include Multifunction operation, SCSI-2 interface, and HP proven reliability. The new 1.3Gig media is only $159 which is only 12 cents per meg.

Bare Drive	Internal / External	$2999 / $3199
16Bit Kit	Internal / External	$3339 / $3599

Special offer purchase 5 more 1.3Gig disks with drive for only $700, or 5 650Meg disk for $479.

Maxoptix

Tahiti IIM Optical Drive
1 Gigabyte Multifunction Magneto-Optical Drive Multifunction operation allows you to use rewritable or WORM (Write Once Read Many) media.
Fast 35ms seek time, SCSI-2 Interface.

1MB Cache	Ext. Drive	$2999	Ext. 16bit Kit $2969
4MB Cache	Ext. Drive	$2799	Ext. 16bit Kit $3009

NEW! Tahiti I
1.3 Gigabyte, 19ms, 4800RPM, Supports 650MB, 1GB, 1.3GB media, Multifunction operation. **$Call**

SHARP

JY-750 650Meg, Multi-Function, 1/2 Height Design
40ms seek time, 256K buffer, SCSI-2 Interface, 3000rpm
Bare $1959 Internal Kit $2179 External Kit $2279

OPTICAL MEDIA

Maxoptix

1 Gig Rewritable for Tahiti Glass	512K Sector	$179
1 Gig Rewritable for Tahiti Glass	1024K Sector	$199
1 Gig WORM for Tahiti IIM Glass	512K Sector	$199
1 Gig WORM for Tahiti IIM Glass	1024K Sector	$199
WORM for RXT-HD or 800HS		$119

Verbatim

High Quality Rewritable Media, Compatibility Guaranteed

3 1/2" 128Meg 512K Sector	(VBR3H1)	$45
5 1/4" 650Meg 512K Sector	(VBR5B2)	**$119**
5 1/4" 650Meg 1024K Sector	(VBR5BA)	$135

HEWLETT PACKARD

5 1/4" 650Meg 512K Sector WORM	(HP92289A)	$139
5 1/4" 650Meg 1024K Sector WORM	(HP92290A)	$149
5 1/4" 1.3Gig 512K or 1024K Sector		$159

Most brands and types available. Call for media not listed.

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DRIVES 1-800-473-0923

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CONTROLLERS

Adaptec

1522M	AT, SCSI, Floppy	$95
1522KIT	OS/2, UNIX, Novell drivers	$141
1522KIT+	Corel CD, Tape, & Optical driver	$217
1542	AT, SCSI, Floppy, Bus Mastering	$229
1542CKIT	Novell, OS/2, UNIX, ZENIX, CD drivers	$265
1542CKIT+	Corel CD, Tape & Optical driver	$329
1742KIT	EISA, SCSI, Floppy, 32Bit, Bus Master	$439

Complete line available, call for pricing

BUS LOGIC

BL445S, SCSI, VESA Local Bus, 32Bit, 2 Floppy $289
BL545S, SCSI, 16Bit ISA, 7 SCSI, 2 Floppy $229
BL747S, SCSI, 32Bit EISA, 7 SCSI, 2 Floppy $399

FUTURE DOMAIN

The best SCSI controllers available!
- Support for the most SCSI devices including FAST SCSI-2
- Support for the most operating systems.
- NLM CD ROM driver allows CD ROM on server.
- 7 year warranty! ASPI compatible.

SCSI VALUE PAK Kits (SVP) include support for Hard Drive, CD ROM, includes SCSI Device Analyzer. Supports FastDisk 32Bit Disk Access in Windows 3.1. This feature makes your Windows 3.1 Scream.

COREL SCSI Kits (CRL) support Hard Drive, CD ROM, removable media, optical, jukebox, & tape backup.

SCSI	SVP	CRL
TMC850M 8Bit	n/a	$129
TMC1680 16Bit with Floppy	$149	$199
MCS700 MicroChannel	$169	$219
TMC950MCD 8Bit with CD ROM Driver		$69

NEW! High Performance IDE Controller Increases Data Transfer Rate By As Much As 60%

1533-18 IDE -Will Co-exist with any other hard drive	$55
1533-21 IDE - On-board Bios runs any IDE drive. - 4 floppy controller* - Runs DJ-20 (and others) @ 1Mb/sec.	$69
1533-11 Floppy only*, Works as secondary	$59

* Floppy controller controls all types incl. new 2.8 Meg!

IRWINDALE

Includes drivers for CD Rom, Removables, Optical

T336, Printer Port SCSI adapter	$99
T348 Plus, High performance Printer Port SCSI	$179

Complete line available, call for pricing

UltraStor

14N, AT, FAST SCSI-2 , 3 Floppy	$149
14F, AT, SCSI-2 & FAST SCSI, 3 Floppy, Bus Master, 64K Cache. OS/2, Novell & UNIX drivers	$209
15C, AT, Ceching IDE, 3 Floppy	$160
24F, EISA, SCSI, 3 Floppy, 64K Cache	$389
34F, VESA LOCAL BUS, SCSI	$279
124F, EISA, 3 **Chennel SCSI Disk Arrey Cntrl**	$1499

MISC. CONTROLLERS

EISA, 4 IDE, 4 Floppy, DTC2290	$169
Always IN2000, AT, SCSI, 2 Floppy	$174
AT, IDE, 2 Floppy, 2 Serial, 1 Parallel (SUPERIO)	$29
ADP-50 8 bit XT to run AT/IDE drives	$49
Micro Channel IDE	$189
AT, IDE, 4 Floppy (WSIDE4)	$59
AT, IDE, 2 Floppy, with BIOS (PROIDEF)	$49
AT, IDE, 4 Floppy, 2 Serial, 1 Parallel (WSIDE4IO)	$79

CARD DRIVES

-Compatible with XT, AT, 386, 486, Tandy, PS/2 30, 30-286

8 Bit	16 Bit	SCSI
45 Meg, 19ms *	$219	$239	n/a
84 Meg, 11ms *	$259	$269	$319
130 Meg, 7ms *	$329	$339	$399
170 Meg, 11ms *	$369	$379	$449

Larger Sizes Available. Effective access time with cache shown * Single Slot Model

Plus 2 Year Warranty, 16 Bit, Single Slot

42Meg $219 85Meg $270 127Meg $340 240Meg $559

TAPE & FLOPPY DRIVES

CONNER

Formerly ARCHIVE Tape Drives

Super Sale! WOW!

250Meg Tape Drive (C250MOT)

☞ **This drive will mount in a 3 1/2" x 1" floppy bay!** Also includes 5 1/4" hardware.
☞ **Two Year Warranty!**
☞ Runs off your floppy controller. Toll Free Technical Support. Includes Third Floppy Cable, Manual, Backup Software, and a **Free Tape**.

Only $178

New! 250Meg External Printer Port Tape Backup (C250CPT)

☞ Plugs into any IBM compatible printer port, you can use tape and printer at the same time.
☞ **15MB/min speed! Two Year Warranty!**
☞ Includes cable, backup software, and a **Free Tape**.

Only $345

High Speed SCSI Tape Backup

☞ Kits include drive, controller, cables, backup software, manual, mounting hardware, and 1 tape.
☞ We have kits for all operating systems, DOS price listed.
☞ Complete internal and external kits available for XT, 286, 386, 486, EISA, Local Bus, PS/2, Printer Port, **MicroMch**, Sun, and others. Call for price quote.

Capacity	Speed	Bare	8Bit Kit	16Bit Kit
250Meg	6MB/min	$379	$469	$569
525Meg	14MB/min	$549	$619	$699
2Gig DAT	11MB/min	$949	$959	$999
4-8Gig *TURBO DAT!*		$1159	$1259	$1339
TURBO DAT is 88MB/min!			Add $100 for external	

HEWLETT PACKARD

☞ **DAT Tape Backup** ☞ **SCSI-2 Interface**
☞ **Hewlett Packard, Quality you can trust!**
Kits include Drive, controller, Backup Software, Manual, Cables, and one 90 Meter tape.

	Bare	8 Bit	16 Bit
Check Out This Price! Lowest Price Ever on a DAT!			
2Gig 12MB/min 35450A	**$750**	**$815**	**$899**
2Gig 12MB/min 35470A	$1079	$1219	$1299
4-8Gig 42MB/min 35480A	$1199	$1399	$1299

***New!* Fastest Turbo DAT drive made!**

DDS-2 Compression Gives 16Gig capacity!

4-16Gig	130MB/min	C1533A	$1549

New! 6 cartridge DAT Changer Store up to 48Gig, $Call
Add $100 for external. Complete kits available for most computers.

MicroSolutions

BackPack External Printer Port Drives.

Floppy 1.2Meg or 1.4Meg / 2.8Meg	$199 / $259
Tape Backup 250Meg	$415

TEAC

5 1/4" 360K / 1.2Meg	$57 / $59
3 1/2" 1.4Meg / 2.8Meg	$54 / $95
All Media Floppy 3 1/2" and 5 1/4" in one	$139

Verbatim

High Quality Tape Cartridges

Qty 1 / 5		DC2120	$17.5/ $15.7
DC6250	$26 / $23	8mm DAT (4Mm)	$17 / $15.7
DC6525	$30 / $28	8mm 112Meter	$15 / $11

Miscellaneous Media

Qty 1 / 5		DAT Cleaning Tapes	$19 / $18
MAG135	$47 / $44	2.8Meg Diskettes	$5 / $4

REMOVEABLE DRIVES

Pull out Hard Drive Bracket for 3.5" IDE / SCSI $65 / $129

SyQuest

We do SyQuest better than anyone!

-Two year warranty on drives, one year on cartridges.
-All kits include high performance controller, 1 cartridge, driver software, instruction manual.
-The high performance SCSI controllers in our kits have these features! (Our competitors don't come close)
1) Supports 7 SCSI devices.
2) Driver that allows changing media without rebooting.
3) Drivers that runs CD ROM and Optical drives.
-All external drives come completly assembled, and feature external ID select and external termination.
-88C drive will read and write to 44 or 88meg cartridge.

	44Meg	88Meg	88C
Bare Drive	$269	$310	$389
Bare External Drive	$365	$415	$505
Internal XT/AT (8Bit) kit	$389	$475	$539
External XT/AT (8Bit) kit	$475	$575	$619
Internal AT (16Bit) kit	**$459**	**$549**	**$589**
External AT (16Bit) kit	$550	$635	$689
External Kit for PS/2	$629	$699	$789
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Company	Profile	Service	Price	Overall Rating
Hyundai Electronics America 166 Baypointe Pkwy. San Jose, CA 95134 (800) 933-3445 (408) 473-9200 Fax: (408) 894-9751	Hyundai began selling its systems direct last year—the same year that its PC manufacturing division moved from Korea to the Silicon Valley. One current best-seller is the Courier Spectra 486SLC notebook. **Business hours:** Mon.–Fri. 6–5. **Tech support:** Mon.–Fri. 8–5; BBS, fax-back service. **Money-back guarantee:** 30 days. **Warranty:** 18 months parts and labor; 1 year free onsite service.	☆ ☆ ☆ ☆	☆ ☆ ☆	★ ★ ★ ★

Company	Profile	Service	Price	Overall Rating
IBM PC Direct 3039 Cornwallis Rd., Bldg. 3 Research Triangle Park, NC 27709 (800) 426-2968 (919) 517-2496 Fax: (919) 517-2050	The company that created PCs began selling them direct last year. The best-sellers are the PS/ValuePaint line and the award-winning ThinkPad notebook. IBM PC Direct accepts trade-ins on IBM and non-IBM systems. **Business hours:** Mon.–Fri. 8–midnight, Sat. 8–7. **Tech support:** 24 hours, 7 days a week; BBS, fax-back service. **Money-back guarantee:** 30 days. **Warranty:** 1–3 years depending on product.	☆ ☆ ☆ ☆ ☆	☆ ☆	★ ★ ★ ★

Company	Profile	Service	Price	Overall Rating
Insight/Hard Drives Int'l 1912 W. Fourth St. Tempe, AZ 85281 (800) 927-7848 (602) 902-1176 Outside U.S.: (602) 350-1145 Fax: (602) 350-1150	Previously three separate divisions, Insight sells its own line of PCs, along with an extensive selection of name-brand peripherals, hard drives, and software. With an inventory of more than 20,000 products, it's no wonder the company provides sales and toll-free tech support 24 hours a day. **Business hours:** 24 hours, 7 days a week. **Tech support:** 24 hours, 7 days a week. **Money-back guarantee:** 30 days. **Warranty:** 1 year, second year available at 9 percent of purchase price.	☆ ☆ ☆ ☆	☆ ☆ ☆	★ ★ ★ ★

Company	Profile	Service	Price	Overall Rating
Keydata Int'l 111 Corporate Blvd. South Plainfield, NJ 07080 (800) 486-7010 (908) 755-0350 Fax: (908) 756-7359	Keydata's been in the direct business for 8 years. It was one of the first direct vendors to offer local-bus systems. New offerings include the Key486 Multimedia Windowstation and the 4-pound Keynote Compact subnotebook. **Business hours:** Mon.–Fri. 9–8, Sat. 10–4. **Tech support:** Mon.–Fri. 9–8, Sat. 10–4. **Money-back guarantee:** 30 days; 7 percent restocking fee on notebooks. **Warranty:** 18 months for desktop PCs; 1-year warranty for notebooks including 1 year free onsite service.	☆ ☆ ☆	☆ ☆ ☆ ☆	★ ★ ★ ★

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Company	Profile	Service	Price	Overall Rating
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Company	Profile	Service	Price	Overall Rating
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Company	Profile	Service	Price	Overall Rating
Northgate Computer Systems 7075 Flying Cloud Dr. Eden Prairie, MN 55344 (800) 548-1993 (612) 943-8181 Fax: (612) 943-6960	Northgate has been selling PCs direct for more than 5 years. The company offers complete networking solutions including servers, disk arrays, and network support and sells its desktop and notebook PCs. **Business hours:** Mon.–Fri. 8–6. **Tech support:** 24 hours, 7 days a week; BBS. **Money-back guarantee:** 30 days. **Warranty:** 1 year.	☆ ☆ ☆ ☆	☆ ☆ ☆	★ ★ ★ ★

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Systems Software Notebooks Peripherals

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PC Magazine, January 26, 1993

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Sources: PC MAG & Computer Shopper review in Jan./July 1993. Compaq ProLinea has no external cache.

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  - **250MB** 12ms IDE Drive with 64K Cache
- 32-Bit VESA Local Bus **WinPro** Graphics Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 50 times faster than standard Super VGA)
- 14" Non-Interlaced 28mm 1024x768 Color Monitor
  - 2 Serial, 1 Parallel & 1 Game Ports
  - Enhanced 101-key Keyboard
  - Hi-Resolution 400 DPI Serial Mouse
  - Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $1675
486/66 DX2 $1925

- 32-Bit VL-Bus IDE Smart Cache HD Controller Add $120
- Replace 1.2MB Drive with 350ms CD-ROM Add $170

EISA SCSI-2 (VL-Bus)

- OverDrive Socket for Future **Pentium**™ Technology
- High Speed EISA DMA with 2 VL-Bus Slots
  - 128K Cache SRAM & Expandable to 256K
  - **8MB** RAM & Expandable to 128MB
  - 1.2MB 5.25" & 1.44MB 3.5" Floppy Drives
- 32-Bit VL-Bus Fast ASPI SCSI-2 HD Controller
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- 32-Bit VESA Local Bus **WinPro** Graphics Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 50 times faster than standard Super VGA)
- 14" Non-Interlaced 28mm 1024x768 Color Monitor
  - 2 Serial, 1 Parallel & 1 Game Ports
  - Enhanced 101-key Keyboard
  - Hi-Resolution 400 DPI Serial Mouse
  - Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $1955
486/66 DX2 $2225

- 15" Flat Screen & **Low Radiation** Monitor Add $100
- 545MB / 1.370MB SCSI-2 Drive Upgrade $450 / $1050

EISA Dream Machine (VL-Bus)

- OverDrive Socket for Future **Pentium**™ Technology
- **256K** Write-Back Cache SRAM & 2 VL-Bus Slots
  - **8MB** RAM & Expandable to 128MB
  - 1.2MB 5.25" & 1.44MB 3.5" Floppy Drives
- EISA or VL-Bus IDE **Smart Cache** HD Controller (8,000/19,000KB/Sec Data Transfer Rate on EISA DMA)
  - **340MB** 12ms IDE Drive with 64K Cache
- 32-Bit VESA Local Bus **WinPro** Graphics Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 50 times faster than standard Super VGA)
- 15" Flat Screen 28mm 1280x1024 Color Monitor (**Low Radiation**, 36% larger edge to edge display)
  - 2 Serial, 1 Parallel & 1 Game Ports
  - Enhanced 101-key Keyboard & Serial Mouse
  - Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $2075
486/66 DX2 $2325

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- VL-Bus Diamond Viper Accelerator Add $220

VESA Local Bus WinMax

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  - 4MB RAM & Expandable to 32MB
  - 1.2MB 5.25" & 1.44MB 3.5" Floppy Drives
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- 32-Bit VL-Bus **Diamond SpeedStar Pro** Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 30 times faster than standard Super VGA)
- 14" Non-Interlaced 28mm 1024x768 Color Monitor
  - 2 Serial, 1 Parallel & 1 Game Ports
  - Enhanced 101-key Keyboard
  - Hi-Resolution 400 DPI Serial Mouse
  - Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $1545
486/66 DX2 $1795

- 15" Flat Screen & **Low Radiation** Monitor Add $100
- Replace 1.2MB Drive with 350ms CD-ROM Add $170

VESA Local Bus Spitfire

- OverDrive Socket for Future **Pentium**™ Technology
  - 128K Cache SRAM & Expandable to 256K
  - **8MB** RAM & Expandable to 32MB
  - 1.2MB 5.25" & 1.44MB 3.5" Floppy Drives
  - VESA Local Bus IDE Hard Disk Controller
  - **250MB** 12ms IDE Drive with 64K Cache
- 32-Bit VL-Bus **Diamond SpeedStar Pro** Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 30 times faster than standard Super VGA)
- 15" Flat Screen 28mm 1280x1024 Color Monitor (**Low Radiation**, 36% larger edge to edge display)
  - 2 Serial, 1 Parallel & 1 Game Ports
  - Enhanced 101-key Keyboard
  - Hi-Resolution 400 DPI Serial Mouse
  - Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

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486/66 DX2 $2075

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  - 4MB RAM & Expandable to 32MB
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  - VESA Local Bus IDE Hard Disk Controller
  - **250MB** 12ms IDE Drive with 64K Cache
- 32-Bit VL-Bus **Diamond SpeedStar Pro** Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 30 times faster than standard Super VGA)
- 14" Non-Interlaced 28mm 1024x768 Color Monitor
  - 2 Serial, 1 Parallel & 1 Game Ports
  - Enhanced 101-key Keyboard & Serial Mouse
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- Three-Year System & Lifetime Labor Warranty

486/33 DX $1895
486/66 DX2 $2145

- Many more CD title options are also available
- 15" Flat Screen & **Low Radiation** Monitor Add $100

ONCE AGAIN **"THE COMTRADE PC"** HAS THE COMPETITION RUNNING FOR COVER. IN REVIEW AFTER REVIEW, CRITIC'S APPLAUD COMTRADE SHOCKING SPEED AND EXTRAORDINARY VALUE. ACCORDING TO THE RECENT PC MAGAZINE, COMTRADE'S 486 SYSTEM "HAS THE PERFORMANCE ISSUE LICKED." IT'S NO WONDER COMTRADE IS AWARDED PC SOURCES MAGAZINE "**DIRECT HIT**" (BEST BUY/EDITOR'S CHOICE) (FEBRUARY 1993). "IT'S A VERY SWIFT GRAPHICS MACHINE," SAYS COMPUTER SHOPPER (MAY 1992). "THAT DESERVES SERIOUS CONSIDERATION FROM ANYONE WHO WANTS TO JUICE UP WINDOWS." COMTRADE'S LATEST VESA LOCAL BUS WINPRO OR VIPER GRAPHICS ACCELERATORS ARE EVEN UP TO 3 TO 10 TIMES FASTER THAN OUR PREVIOUSLY REVIEWED SYSTEMS.

NO CONTEST!
COMTRADE PROCESSOR OUTPACED ALL THE OTHER - WINDOWS SOURCES, JUNE 1993.

Comtrade's Thunderous VL-Bus Video

COMTRADE DIAMOND VIPER	62
COMTRADE WINPRO	21
VL-B SPEEDSTAR PRO	17
ATI ULTRA PRO	14

WinPerf 3.11 (Million pixels per second)
Diamond Viper with new caching driver.

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intel inside

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- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

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486DX-33 EISA...1,318
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486DX-50 ISA 1,298
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- 200MB Fast SCSI Hard Drive
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- Full Tower Case
- Enhanced 101-Key Keyboard
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486DX-50.....2,178
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- 4MB RAM Expandable to 128MB
- 1.2MB & 1.44MB Floppy Drive
- VESA Local Bus IDE Controller
- 2 Serial, 1 Parallel, 1 Game Ports
- 200MB Fast IDE Hard Drive
- Orchid Fahrenheit VLB (S3-805)
- CTX 14" NI .28 SVGA Monitor
- Mini Tower or Desktop Case
- Enhanced 101-Key Keyboard
- Free Microsoft DOS 6.0
- Free Mouse & MS Windows

486DX2-66.....$1,828
486DX-50.....1,758
486DX2-50 1,728
486DX-33.....1,628

YOUR CHOICES

- 15" NI .28 Monitor.....Add $110
- 340MB IDE Hard Drive .....Add 100
- ATI Ultra Pro VLB w/1MB.....Add 140
- Mitsumi CD-RDM (350MS) .....Add 190

VESA DELUXE SYSTEMS

- Intel Pentium Technology Ready
- 64K Cache Expandable to 256K
- 4MB RAM Expandable to 32MB
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- 1.44MB Floppy Drive
- VESA Local Bus IDE Controller
- 2 Serial, 1 Parallel, 1 Game Ports
- 130MB Fast IDE Hard Drive
- Diamond Speed Star Pro VLB
- CTX 14" .28 SVGA Monitor
- Mini Tower or Desktop Case
- Enhanced 101-Key Keyboard
- Free Microsoft DOS 6.0
- Free Mouse & MS Windows

486DX2-66.....$1,598
486DX-50.....1,528
486DX2-50 1,498
486DX-33.....1,398

YOUR CHOICES

- CTX 14" NI .28 Monitor.....Add $30
- 200MB IDE Hard Drive .....Add 60
- Orchid Fahrenheit VLB (S3-805) Add 40
- Mitsumi CD-RDM (350MS).....Add 190

VESA WINDOWS SYSTEMS

- Intel Pentium Technology Ready
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- 4MB RAM Expandable to 32MB
- 1.2MB Floppy Drive
- 1.44MB Floppy Drive
- VESA Local Bus IDE Controller
- 2 Serial, 1 Parallel, 1 Game Ports
- 200MB Fast IDE Hard Drive
- Orchid Fahrenheit VLB (S3-805)
- 15" NI .28 SVGA Monitor
- Full Tower Case
- Enhanced 101-Key Keyboard
- Free Microsoft DOS 6.0
- Free Mouse & MS Windows

486DX2-66.....$1,898
486DX-50.....1,828
486DX2-50 1,798
486DX-33.....1,698

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- 4MB RAM Expandable to 32MB
- 1.2MB & 1.44MB Floppy Drive
- VLB IDE Controller w/2S/1P/1G
- 130MB Fast IDE Hard Drive
- Diamond Speed Star Pro VLB
- CTX 14" NI .28 SVGA Monitor
- Hi-Speed CD-ROM w/2 speakers
- Sound Blaster Pro Deluxe
- Mini Tower or Desktop Case
- Enhanced 101-Key Keyboard
- Free Microsoft DOS 6.0
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486DX-50.....1,878
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- VESA Local Bus IDE Controller
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- 340MB Fast IDE Hard Drive
- ATI Ultra Pro VLB w/1MB
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- Full Tower Case
- Enhanced 101-Key Keyboard
- Free Microsoft DOS 6.0
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486DX2-66.....$2,648
486DX-50.....2,578
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486DX-33.....2,448

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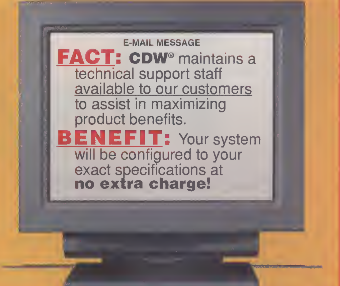

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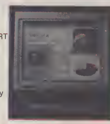

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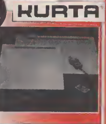

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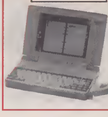

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LDGITECH ScanMan 32/Scanman 256	99.55 / 169.25
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MICRDSDFT Mouse V2.0 Bus 5 Pack	329.32
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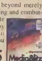

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PERIPHERALS AND SOFTWARE SPECIALISTS *(Continued)*

Company	Profile	Service	Price	Overall Rating
Bulldog Computer Products P.O. Box 1459 610 Industrial Park Dr. Evans, GA 30809 (800) 438-6039 (706) 860-7364 Fax: (706) 860-7358	The Bulldog name is a familiar one to the direct channel, but the current company as such has been selling direct since only January of this year. The company primarily sells name brands, but also offers a system under its own label. Watch for good deals on Hewlett-Packard and Novell products in the months to come. **Business hours:** Mon.–Fri. 8:30–7:30, Sat. 9–2. **Tech support:** Mon.–Fri. 9–5. **Money-back guarantee:** None; returns accepted for incompatible products with a 15 percent restocking fee. **Warranty:** Provided by manufacturer.	☆ ☆ ☆	☆ ☆ ☆ ☆	★ ★ ★ ★

Company	Profile	Service	Price	Overall Rating
CampuClassics 7959 Deering Ave. Canoga Park, CA 91304 (800) 733-3888 (818) 347- 7500 Outside U.S.: (818) 347-2444 Fax: (818) 347-9977	Choose from more than 10,000 software titles when you shop CampuClassics. Best-selling products include the DOS 6.0 upgrade, Novell NetWare, and the Energizer Bunny screen saver. After business hours, fax your order. Peripherals are also available. **Business hours:** Mon.–Fri. 7–6, Sat. 10–2. **Tech support:** None. **Money-back guarantee:** Up to 30 days for unopened packages or defective products, 15 percent restocking fee. **Warranty:** None.	☆ ☆ ☆	☆ ☆ ☆ ☆	★ ★ ★ ★

Company	Profile	Service	Price	Overall Rating
ComputAbility P.O. Box 17882 5139 W. Clinton Ave. Milwaukee, WI 53217 (800) 556-9951 (414) 357-8181 Fax: (414) 357-7814	This 11-year veteran of the direct market sells just about everything except systems. Look for special offers on multimedia products such as upgrade kits, CD-ROMS, sound cards, and CD-ROM titles. The company also sells consumer products such as VCRs and camcorders. **Business hours:** Mon.–Fri. 8–8, Sat. 11–5. **Tech support:** Mon.–Fri. 1–5. **Money-back guarantee:** None. **Warranty:** Provided by manufacturer.	☆ ☆ ☆	☆ ☆ ☆ ☆	★ ★ ★ ★

Company	Profile	Service	Price	Overall Rating
Dustin Discount Software 20969 Ventura Blvd., Suite 13 Woodland Hills, CA 91364 (800) 274-6611 (818) 710-9174 Fax: (818) 884-5310	Dustin ships software the same day it's ordered and provides free ground shipping. It also sells CD-ROM titles and peripherals, including modems, sound cards, and painting devices. You can fax in your order anytime, day or night. **Business hours:** Mon.–Fri. 6–6, Sat. 10–2. **Tech support:** None. **Money-back guarantee:** 30 days, 15 percent restocking fee. **Warranty:** Provided by manufacturer.	☆ ☆ ☆	☆ ☆ ☆ ☆	★ ★ ★ ★

Systems Software Notebooks Peripherals

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2MB 92F9935 $79 4MB 92F9694 $149
PS/1 Consnltent, Essentiel, Expert models x43, x44, PS/Voluepoint oll models except Cxx series
4MB 96F9290 $159 16MB 96F9291 $579
PS/1 Consnltent, Essential, Expert models x76
16MB Kit 96F9291 $579
PS/2 25/286, 30/286, memory adapter 1497259
2MB Kit 30F5360 $79
PS/2 35SX; LS, 40SX, 50Z, 55SX; LS, 65SX; LS, 70, XStotlon
1MB 6450603 $49 2MB 6450604 $75
PS/2 70-A21; A61; 821; 861, PS/1 Consnltant, Essential, Expert models x11, x13, x14, PS/Voluepoint Cxx series
2MB 6450608 $75
PS/2 35SX; LS, 40SX, 55SX; LS, 65SX; LS, XStation, PS/ Valuepoint Cxx series, adapter board 34F3011 or 34F3077
4MB 34F2933 or 87F9977 $149
PS/2 35SX; LS, 40SX, PS/Volnepoint Cxx series
8MB 6450129 $299
PS/2 90 XP, 95 XP, P75 (pairs), 56, 57 (all), PS/1 Pro M2123
2MB 6450902 $89
PS/2 90 XP, 95 XP, P75 (pairs), 56, 57 (all), PS/1 Consnltent, Essential, Expert models x11, x13, x14, PS/1 Pro M2123
4MB 6450128 $149 8MB 6450130 $299
Expansion boards for 50, 50Z, 55SX, 60, 65SX
2-8MB w/2MB 1497259 $269
Expensinn boards for all models 70, 80
4-16MB w/4MB 34F3011 $409

Dell

Power Desktop 325D; P, 3330, 333P, 433P, 486P, 4860
1MB 310-2505 $59 4MB 310-2507 $149
PowerLiee Workstation 420; 425; 433; 450; 4500E/2, 466DE
2MB 310-2466 $99 8MB 310-2468 $319
PowerLion Workstntion 420; 425; 433; 450; 450SE/2, 466SE
32MB Kit 310-2630 $1199
NEW **Performance T, L, & M series**
4MB 310-3325 $159 16MB 310-3327 $579
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4MB ME-432 $179 8MB ME-102 $319
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Zenith Z-386/20; 25; 33, 33E
1MB ZA3800ME $49 4MB ZA3800MK $149
Zenitk Z-386SX/20, 286LP+, Z-LS
2MB Kit Z-605-1 $89
Zenitk 486/33ET; 25E
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Adventegel Pro 486DX/33; SX/25, Breve LC 4/25s; 33; 33s; 50d; 4/66d
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2MB 500718 004, 780-005 $119
Adventagel 486/25; 33; 33p; SX20, Power Premlnm 3/33, 4/33; 33s; 50d; 66d, Premium 386/33TE, 486/25; E; 25TE; 33; 33E; 33TE, Premiem II 386/25; 33, 486/33, 486SX/20 Premium Server SE 4/33
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Compaq

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4MB 141684-001 $159 8MB 141685 001 $309
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4MB 113132-001 $169 4MB 113645-001 $219
DeskPrc 386s/16
4MB 112534-001 $169 4MB 113634-001 $229
DeskPro 3/25i; 33i,4/25IS; 33i; 66i, 286N; 386N; 386SX/20; 20N, SystemPro LT Series, Portoble 486c, M Series
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4MB 118690-001 $149 8MB 112877-001 $309
ProSlgnla PC Server 486/33; 0X2/66
16MB 149320-001 $999 32MB 149147-001 $2439
DeskPro 386-33, 486-33, SystemPro
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Vectra 486PC; 25T; 33T; 486s/20; 4/25M; 33N; 50M; 66M
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2MB 02381A $89 8MB 02152A $309
Vectra 486/25N; 486/33N; 486/50M; 486/66N
16MB 02676A $579
Vectre 386/33N; 33MI
2MB 02714A $129 8MB 02715A $399

NEC

PowerMote 286/12; SX/16, SX/20
2MB Kit OP-410-8103 $99
PowerMote SX/20
2MB CPU Upgrade OP-410-8101 $189
2MB Exp Board OP-410-8102+8103 $209
PowerMnte 386/33i; Express Te, e series
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LAPTOP & NOTEBOOK MEMORY

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PowerExoc 3/25SL, 3/25SL-C, EL	4MB	$179
	16MB	$1299
PowerExoc 4/25SL	4MB	$209
Premiem Exec 286, 386SX/20; 25; 25C	4MB	$129

Compoq

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T3100SX, 3200SX, SXC	2MB	$89
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NEW T4500	8MB	$619
	16MB	$999
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L40SX, PS/Note 182	8MB	$285

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Z-Sport 325S	2-6MB	$139
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MostersPort 386SX	2MB	$109
PS/Mote N45SL	2MB	$136

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NP LoserJet IIP, III, IIIP, IIID
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NP LoserJet II & IID
2MB 33444B $99 4MB 33445B $159
IBM Laser 4029 oll models
2MB 1183334 $99 4MB 1183335 $159
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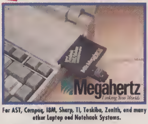

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PERIPHERALS AND SOFTWARE SPECIALISTS

Company	Profile	Service	Price	Overall Rating
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Multiple Zones Int'l 17411 N.E. Union Hill Rd. Redmond, WA 98052 (800) 258-8088 (206) 883-1975 Fax: (206) 881-3421	Multiple Zones Int'l has been selling computer products direct for 7 years. Current best-sellers include DOS 6.0, CorelDraw, and PageMaker. Look for upcoming deals on Windows software bundles, Windows NT, and a Microsoft mouse bundle. Overnight delivery is standard on all orders for a flat rate of $3. **Business hours:** Mon.–Fri. 5 a.m.–11 p.m., Sat. and Sun. 5 a.m.–8 p.m. **Tech support:** Mon.–Fri. 7–6. **Money-back guarantee:** 30 days–1 year. **Warranty:** 120 days.	☆ ☆ ☆ ☆ ☆	☆ ☆ ☆	★ ★ ★ ★
PC Connection Six Mill St. Marlow, NH 03456 (800) 800-0005 (603) 446-3383 Fax: (603) 446-7791	PC Connection was one of the first direct software sellers. The company's offerings have expanded to include peripherals, printers, and Compaq systems. The excellent service and support includes Sunday business hours, Saturday toll-free tech support, and standard overnight shipping for a flat fee. **Business hours:** Mon.–Sun. 8–5. **Tech support:** Mon.–Fri. 9–9, Sat. 9–5:30. **Money-back guarantee:** 120-day limited warranty. **Warranty:** Minimum of 120 days, 3-year warranty on Compaq systems.	☆ ☆ ☆ ☆ ☆	☆ ☆ ☆ ☆	★ ★ ★ ★ ★
TigerDirect 800 Douglas Entrance Penthouse Coral Gables, FL 33134 (800) 888-4437 (305) 443-8212 Outside U.S.: (305) 443-8212 Fax: (305) 529-2990	TigerDirect is known for its informative catalogs of software, CD-ROM titles, and peripherals. One current best-seller is the NEC CD-ROM bundle. **Business hours:** Mon.–Fri. 8–midnight, Sat. 8:30–8, Sun. 11–5. **Tech support:** None. **Money-back guarantee:** 30 days. **Warranty:** Provided by manufacturer.	☆ ☆ ☆ ☆	☆ ☆	★ ★ ★

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Netware 3.11-50 User 2589
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15/17/20 ....660/1225/1915

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Graphica Vantage w/ 1 mg 229
VGA Integra 512K 89

BOCA
Basic VGA 47
Super VGA 1 mg 109
Super VGA 1 mg 18.8 mil. colors celll

DIAMOND
Diemond Speedstar 24x w/ 1 mg 185

ORCHID
Prodesignar IIS/EISA w/ 1 mb 289
Prodesignar IIS w/ 1 mb 159
Orchid F1280 w/1 mg 189

Modems & Fax

BOCA
14.4 fax modam int/ext 229/265

CARDINAL
2400 INT/EXT 55/75
2400 INT/EXT w/MNP 89/99
9600 INT/EXT 179/239
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INTEL
Satisfaction 400/400E 399/459

PRACTICAL PERIPHERALS
FAX ME 185
PM 14400 FXPPM Pockat Mod 359
PM 14400 FXMT axt v 32 bis ....call
PP 9600 int/ext ....CALL

US ROBOTICS
Sportster 9600 int/ext ....CALL
Sportatar 14.4 fax/mod int/ext ....CALL
Courier HST Duel 16.8 759

ZOOM
14.4 fax/modem int/ext ....$ 199/249

Printers

CANON
BJ10ex/200 ....239/275
BJ300/330 ....325/495
LBP-4sx laser 669
LBP-8sx laser 1289

DICONIX
180si Inkjet 239
701 Inkjet 375

EPSON
AP 2250/3250 ....155/189
FX870/FX1170 ....259/345
LQ570/LQ1070 ....235/339
LQ870/LQ1170 ....425/575
LQ2550 849
LX810 169
EPL8000 laser 839
DFX5000/8000 ....1259/2129
Action Laser 1000/1500 ....599/659
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HEWLETT-PACKARD
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Laserjet IVM w/ toner 1949
Laserjet IVL+/IIIP CALL/889
NEW! HP IVsi 2979
Desk Jet 500/500c 379/509
Desk Jet 550c 699

OKIDATA
ML184/380 ....229/215
ML320/321 ....299/419
ML590/591 ....419/569
395/395c ....NEW!!!
LASER 400/810 ....549/959
830t/850 NEW! 1149/1259
PM3410 1199

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Silentwriter 95fx 1999
Silentwriter 97 1829

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Upgrade- HP 2mb/4mb 109/179
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Pacific Page PE/PEXL call/699
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Font Bank Cartridge 1.5 Mb 269

Mice & Misc.

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Microsoft Ball Point Mouse 118
Logitech Scan Men 256 w/ OCR 279
HP Scanjet IIP w/interfaca ....CALL
HP Scanjet IIC w/interfaca ....CALL
Soundblastar Pro 16 ....CALL

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Back-upa 600/900 ....279/389

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Bulldog's Standard Configuration
Dual Floppy Drives • Super VGA Card w/ 1 Mg • 14" SVGA Monitor (1024 x 768) • DOS 5.0 • Windows • Mouse • 1 year warranty!

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386DX-40 w/4MB w/ 130 Mg 1225
486SX-25 w/4MB w/ 130 Mg 1350
486DX-33 w/4MB w/ 245 Mg 1675
486DX-50 w/8MB w/ 245 Mg 2045
486DX2-66 Loc Bus • 8MB • 245Mg 2345

Call for other configurations

Canon 486 Systems ..... CALL

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NEW! Bernoull Multidisk 150 ....call!
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IRWIN
Accutrak 120+/250+ 175/229
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COLORADO MEMORY SYSTEMS
DJ10 120 Meg Int Jumbo 145
DJ20 250 Meg Int Jumbo 199
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MICRO SOLUTIONS
80/250 Backpack 395

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Six Pack 286 w/0K AT 95

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BOCA BOARDS.... CALL!

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387 SX or DX 85
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Evans, Georgia 30809
OPEN weekdays: 8:30 a.m. to 7:30 p.m.
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BULLDOG
COMPUTER PRODUCTS

No charge for credit cards. Shipping and handling extra (minimum $10). APO & FPO addresses additional 5%. Product warranties, offers and claims are handled by the manufacturer. DOA's repaired or replaced at our option during the first 30 days only. No returns on used items. All return shipments are subject to a 15% minimum restocking fee. Defective software replaced with same item only. Call 706-860-7364 for a Return Authorization number prior to returning any product. Shipping charges are non-refundable. Bulldog cannot guarantee compatability. All prices are U.S. and are subject to change and availability. GA residents add sales tax.

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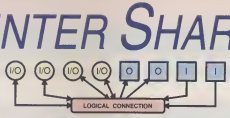
PRINTER SHARING & MEMORY

800-238-9415

I/O = input /output
= serial
= parallel



LCX-1000 (1Mb) **$495**
8 ports; 4 serial i/O; 57,600 bps
2 parallel in, 2 parallel out

LC-256 (256Kb) **$375**
LC-512 (512Kb) **$425**
8 ports; 4 serial i/O; 19,200 bps
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LXFR-ETC **$49**
Windows & OS/2 File Transfer
4 user license, for LC or LCX

PB-42PP-256Kb **$199**
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6 parallel ports; 4 in / 2 out
Upgradable to 4Mb; 25,000 cps

LC-41PAS **$69**
5 parallel ports; 4 in / 1 out
Smart-switch; 25,000 cps

LC Jr.-256 (256Kb) **$199**
LC Jr.-512 (512Kb) **$249**
5 ports; 4 serial in, 1 parallel out
Up to 115,200 bps

SPPS **$49**
9600 bps to 115,200 bps
Serial / Parallel Converter

PB-11PP-1Mb **$199**
2 parallel ports, 1 in / 1 out
Upgradable to 16Mb; 75,000 cps

PCMCIA 2.0 *SRAM Cards:*
512Kb - $120, 1Mb - $175, 2Mb - $285
Toshiba:
1000XE/SE/LE, 1800, 1850, 2000,2000SX/SXE, 2200SX
2Mb - $90, 4Mb - $150, 8Mb - $275
3300SL
4Mb - $150, 8Mb - $225
4400SX
4Mb - $150, 8Mb - $275
Powerbook & MAC:
100/140/145/170/160/165/180
6Mb - $250, 8Mb - $310, 10Mb - $390
DUO 210/230:
6Mb - $280, 8Mb - $320, 10Mb - $410
Cent.610/650, Quad.800, LCIII
4MB - $145, 8Mb - $260
MAC SIMMs (70ns.):
1x8 - $32, 4x8 - $124, 16Mb - $495

LOGICAL CONNECTION® 4660 Portland Road NE #108 Salem, OR 97305-1658 Tech.: (503) 390-9375 **FAX: (503) 390-9372**

Circle 125 on reader service card.

PC Computing

COMING SOON

Pentium: The First Generation

Intel's Pentium chip is finally rolling out of the factories and into the hands of users. The power and performance benefits of the new "586"-based systems—coupled with low prices—mean the Pentium systems could benefit more users than any other computer yet. Should you purchase a Pentium over a 486-based system? Which Pentium systems will hit the market first, which will meet your needs best, and which are worth waiting for? Find out in our comparison of five Pentium systems competing against a 486DX system.

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Color Presentations

Long gone are the days of bulleted text on overhead transparencies—presentation software and hardware convey your message much more clearly and colorfully. But which products *really* make a difference, and which are so easy to use that you can produce a great-looking presentation in no time flat? Our Decision Maker and Usability Lab test findings help you choose the best graphics software, color printers, and LCD panels for your needs.

NetWare 4.0

If you spend countless hours configuring networks using Novell NetWare, you'll want to know how Version 4.0 differs from the old version and whether it warrants an upgrade. We test and evaluate NetWare 4.0's features and tell you how they compare to those in NetWare 3.11 and other network operating systems, like Windows NT.

Shopping Hand Scanners? ENVISIONS' Bundles Are MORE LOGICAL THAN LOGITECH™

BY FAR!

Grayscale

Color

Let's be reasonable. Both ENVISIONS and Logitech offer terrific hand-held scanners with premium software to scan text and graphics. They both can scan full pages using automerge technology. Then why does Logitech make you pay so much more? We can't figure it out either. It's *not logical!*

When compared against eight other hand scanners, including the ScanMan Model 256, *"The ENV256 is a bargain."*—PC Computing 7/92

ENV256 Grayscale Scanner and Software Bundle!

ENV256 Scanner, HALO Desktop Imager, Perceive Personal OCR, Clip Art Library, ScanPad

Total Value $557

$199

EST4530B

Features and Bundled Items:	ENVISIONS ENV256™	Logitech ScanMan™256	ENVISIONS ENVColor™	Logitech ScanMan™Color
Resolution	Up to 400 dpi	Up to 400 dpi	Grayscale: 400 dpi Color: 200 dpi	Grayscale: 400 dpi Color: 400 dpi
Grayscales/Color Capability	256 Grayscales	256 Grayscales	262,144 Colors	16,800,000 Colors
Automerge/AutoStitch	✓	✓	✓	✓
Image Editing Software Included:	Halo Desktop Imager PC Magazine's Editors' Choice	FotoTouch by Logitech	Halo Desktop Imager PC Magazine's Editors' Choice	FotoTouch Color by Logitech
Text Scanning Software Included:	Perceive Personal	Catchword Pro by Logitech	Perceive Personal	Available at additional cost
Free Clip Art Library & ScanPad	✓	Available at additional cost	✓	Available at additional cost
Your Price	**$199.00**	**$344.99***	**$299.00**	**$524.99***

*Average of three prices quoted by Eggbread Software stores in the San Francisco Bay Area on June 8, 1993

Hand Scanner Bundles require 386 or higher, Windows 3.1, 4MB RAM, 5MB hard disk space free.

ENVColor Scanner and Software Bundle!

ENVColor Scanner, HALO Desktop Imager, Perceive Personal OCR, Clip Art Library, ScanPad

Total Value $674

$299

EST4455B

Both scanners comes bundled with text scanning software, image editing software, plus a scanpad and clip art library!

Free!

Free!

Free!

Ready-To-Scan Images with Neat ScanPad, Free!

ENVISIONS' Clip Art has over 13 categories of hundreds of useful images. The **ScanPad** holds pages in place while scanning. Use both to add eye-catching documents! *Retail Value $39.95*

Scan Text for Quick Data Entry

Perceive Personal's accuracy and speed saves time and effort when scanning text. **Perceive** recognizes a variety of text styles and sizes. Up to 99.5% accurate; there's no need to ever re-type! *Retail Value $195*

Automatically Merge Multiple Scans and Create Posters

HALO Desktop Imager brings full desktop scanner power to your hand-held! Automerging assembles multiple scans with ease. Powerful printing capabilities! *Retail Value $139*

One Year Warranty!

"I am thrilled with my ENV256 and software. This package allows me (a first-time scanner user) to perform a wonderful variety of things at a reasonable price."

—Bob Temple, Hackettstown, NJ

HALO Desktop Imager is a *"...wolf in sheep's clothing....High-end features disguised in a low-cost package."*

—Seybold Report on DTP

Restocking fee may apply

TWAIN Compatibility

Questions? We love questions!℠ Call our scanner hotline:

(800) 926-SCAN (7226)

Local (415) 692-9061 • Fax (415) 692-9064 Envisions Solutions Technology, Inc., 822 Mahler Road, Burlingame, CA 94010

ENVISIONS

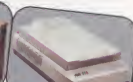
Scanner Solutions Made Easy

With ENVISIONS,

YOU CAN SCAN!

Scanned with the ENVColor hand scanner at 200 dpi. See special $299 bundle on the back of this insert!

ENVISIONS is your authorized source for HP scanners and DeskPaint.



ENVISIONS color scanner with optional transparency attachment.

Flatbedmuch Pro large format scanner. Call us for information.

ENVISIONS award-winning color scanner. (Does that pop!)

ENVISIONS color scanner with optional document feeder.

ENVISIONS grayscale scanner. (Details on back of this insert!)

...and create documents with text and images that really communicate!

Scanned Text
OCR software used to translate into ASCII and export to word processor.

Scanned Images
Image editing software used to resize and retouch photos and line art.

Let ENVISIONS show you how to scan!

The demand for scanner solutions is growing. Desktop publishing, text scanning, multimedia, and CAD applications require sophisticated input technology, making scanners the perfect solution for productivity. As scanner specialists, ENVISIONS is ready to assist in selecting the solution that is right for you.

Founded in 1989 with the charter of bringing the benefits of scanning to all computer users, today ENVISIONS has over 45,000 customers world-wide, including Air France, AT&T, Coca-Cola, GTE, Walt Disney, NBC, Raytheon, Lockheed, IBM, Proctor & Gamble, General Motors, UPS, USA Today, and Yale University.

ENVISIONS offers you technical expertise, specialized products, and aftermarket support so your scanner selection is made easy and affordable. Let us explain the many ways in which scanning will make your life easier.

ENVISIONS provides each customer:

- High quality, affordable scanning solutions. Our large volumes of scanner sales translate into lower prices for you.
- The best choice of products. Select among ENVISIONS own brand and other established names like Hewlett Packard and Mitsubishi.
- Knowledgeable, trained consultants who are eager to answer your questions, inform you on the technology that's best for your application, and can help you decide which product will meet your needs.
- Unlimited lifetime technical support by ENVISIONS' trained scanner specialists.
- A company that cares about your satisfaction. Use our 30-day money back guarantee if you are not completely thrilled with your scanning experience! (Restocking fees may apply)

Our scanner experts can answer your questions, simplify your installation, and keep you productive!

Questions? We have questions!™ For a free consultation regarding your scanner needs or to place an order, just call ENVISIONS' toll-free scanner hotline today.

ENVISIONS

Scanner Solutions Made Easy

Call for a catalog today!

1-800-926-SCAN
(7226)

This is the Scanner Abe Would Buy!

Save with ENVISIONS' Bundles!

Add These Software Values!

The Accloimed Image Production Tool—Adobe Photoshop for Windows

Photoshop 2.5 for Windows has revolutionized the world of art production with its amazing image enhancement power! Digital image editing and professional prepress production is now in one software solution: **Photoshop** lets you create your own original art, edit scanned images, and import renderings from other applications. A variety of built-in painting, editing, and color correction tools ensures that you get professional-quality results. **Photoshop** supports a large selection of file formats for easy import/export of image files.

Call

Special price—only available with the purchase of ENVISIONS flatbed scanners!

- Edit images directly in CMYK mode
- Convert RGB images to CMYK for prepress art
- Add color or take it away; create dramatic duotones, tritones, and quadtones
- Retouch fine details delicately with dodge and burn tool
- New Variations feature lets you preview a range of color corrections simultaneously for creative power and flexibility

Retail Value $895

Automatically Merge Multiple Scans and Create Posters

HALO Desktop Imager lets you easily produce high quality images using an array of powerful tools.

- Impressive automerge capability yields large seamless images
- Scan any size; print tiles for a wall poster
- Blow up an image as high as 10,000% using minimal disk space
- Preview mode takes the guesswork out of fine-tuning

Retail Value $169

$79

MED1003

"HALO Desktop Imager is a wall in sheep's clothing... high-end features disguised in a low priced package."
—Seybold Report on Desktop Publishing

Scanner Software From ENVISIONS

Scan and Fill Forms Fast and Easily

ScanType for Windows lets you automate any tedious form-filling task quickly and accurately by computer! Simply scan any form, display it on your monitor, and fill it directly on screen. Or, bring up a previously scanned and saved PCX form file and effortlessly fill it.

- Correct mistakes before printing; saves time, paper, forms
- Store repetitive or database info
- Accepts all fonts installed in Windows
- Twain-compatible
- Display and fill incoming faxes, then send the fax out through your fax board
- Output onto preprinted forms or plain paper

Value $149

$99

EST9202

Scan into CAD with Automatic TIFF to DXF

ENVISION IT takes scanned graphics and converts them to use with your chosen application and most CAD and drawing programs. If your CAD program asks for vector data, and you only have a raster image, **ENVISION IT** solves this problem with its break-through conversion technology which changes the dots to lines, and gives you the freedom to vector-edit your scanned image. **ENVISION IT** converts your TIFF (raster) file to a DXF (vector) file automatically.

- Accurate conversion; produces few elements
- Supports large PCX, TIFF and compressed TIFF files
- Reads TIFF, ASCII Text, ASCII X-Y Coordinates
- Reads/writes DXF, HPGL, PCX, ENV
- Writes EPS, GEM, IGES, OCR, DC3, RIB
- Stretch, edit, rotate, enlarge line art without losing integrity

Value $199

$149

EST1000

"ENVISION IT is a kind of trade secret for me.... I use it to convert and clean up engineering drawings. It takes just minutes to convert and clean up drawings—(a process) that used to take me two days."
—Bruce Zeuli, Micro Images, San Francisco, CA

Scan X-Rays, Transparencies, Slides

Give yourself the flexibility to scan color slides, transparencies, or x-rays with **ENVISIONS'** optional scanner transparency attachment. **Halo Desktop Imager included free with transparency attachment!**

Transparency Attachment $699

ENV6100/24Pin: EST9800B
ENV8100: EST9801B

Save Time Scanning Multiple Pages

Make text scanning even faster by adding an optional 25-page automatic document feeder. You'll be glad you did!

Automatic Document Feeder $449

ENV6100: EST9100
ENV8100: EST9101

In speed and accuracy tests against six top brands, "the (ENV6100) read and processed each page with zero errors." —PC Sources 4/92
The ENV6100 contains the same scanner engine as the UMAX630, which was used in this test.

ENVISIONS
Scanner Solutions Made Easy

Questions? We love questions!SM Call our scanner hotline:

(800) 926-SCAN (7226)

Local (415) 692-9061 • Fax (415) 692-9064 Envisions Solutions Technology, Inc., 822 Mahler Road, Burlingame, CA 94010

We Cannot Tell A Lie—

Choose Your Scanning Advantage

- 600, 800, or 1200 dpi base resolution
- 16.8 million colors for true-to-life images
- 256 grayscales deliver rich-toned scans
- 8.5" x 14" scanning window (takes legal sized documents)
- Self-aligning optics produce high resolvability and reads line art details
- Single light source ensures exact color registration
- On-board I/O buffer quickens scanning time
- 30 day money back guarantee and 1 year warranty

Stop Retyping! Scan the Text Instead!

ExperVision TypeReader OCR is the 'no-brainer' way to get text off the page and into your computer files. Tests prove that TypeReader delivers as good or better results than OmniPage® Professional.

TypeReader is incredibly fast with almost 100% recognition accuracy. Converts text into most all popular word processing formats. Deferred batch processing and format retention, plus superior proofing is what makes TypeReader "a quicker, better OCR..."—Infoworld 1/13/92

TypeReader scanned on the **ENV6100** recognizes text this size (8 points) with near 100% accuracy!

With TypeReader on the **ENV8100** and **24Pro**, you can scan and recognize text this size (6 points) with near 100% accuracy!

A $695 value; bundled with ENVISIONS color flatbed scanners!

The truth is self evident: all scanners are *not* created equal!

For this reason, **ENVISIONS** offers color flatbeds in a variety of base resolutions. Whether your job involves general color scanning, intensive text document scanning, or high-end professional prepress art production, **ENVISIONS** has a scanning solution that's right for you.

Our penny scans illustrate the facts. A high resolution scanner will deliver a truer, crisper image, especially when enlarged. No other scanner in this class can scan a penny—*and capture Lincoln sitting in his monument*—as well as ours!

Sampled down to 266 dpi, size changed proportionately:

Penny scanned at 600 dpi.

Penny scanned at 800 dpi.

Penny scanned at 1200 dpi.

Emancipate Your Creativity!

Picture Publisher LE image editing software offers state-of-the-art darkroom controls on graphics and photos. Powerful enhancement and editing tools will be at your fingertips, giving you access to limitless creative possibilities!

Image Editing for Windows Limited Edition Version

Use the Sharpen feature to get crisp, clear images. Retouch and apply filters to achieve special effects. Make images opaque or transparent for background use. Mask around subjects to cut and paste elsewhere, or to isolate for editing.

A $395 value; bundled with ENVISIONS color flatbed scanners!

Scanner Model	Base Resolution/ Max. Resolution	with Halo Desktop Imager	with Picture Publisher LE and TypeReader
ENV6100	600 dpi/1200 dpi	$849 EST.3044B	$999 EST.3019B
ENV8100	800 dpi/1600 dpi		$1249 EST.3021B
ENV24Pro	1200 dpi/2400 dpi		$1999 EST.3028B

TWAIN Compatibility

ENVISIONS flatbed scanners and software require 386 or higher, Windows 3.1, 4MB RAM, 8MB hard disk space free, ISA slot available for interface card. PS/2 MCA version also available

ENVISIONS

Scanner Solutions Made Easy

Questions? We love questions! Call our scanner hotline:

(800) 926-SCAN (7226)

Local (415) 692-9061 • Fax (415) 692-9064 Envisions Solutions Technology, Inc., 822 Mahler Road, Burlingame, CA 94010

PC Computing FREE PRODUCT INFORMATION

Circle the numbers below corresponding to products featured in this issue's advertisements and listed in the Editorial Product Index. Manufacturers will mail product literature to you free of charge.

Void after November 30, 1993

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Please answer questions below:

1. **Where do you use your computer?** (Check one only)
   A ☐ Home B ☐ Business C ☐ Both
2. **What kinds of computers do you use?** (Check all that apply)
   D ☐ IBM/Compatible Laptop E ☐ IBM/Compatible Desktop F ☐ MAC
3. **Do you plan to buy any of the hardware or software mentioned below in the next three months?** (Check all that apply)

HARDWARE
G ☐ PC
H ☐ MAC
I. ☐ Laptop
J. ☐ Printer
K. ☐ Monitor
L. ☐ Disk/Tape Back-up
M. ☐ Add-in Board
N. ☐ Modem
O. ☐ Input Device
P. ☐ Local Area Network

SOFTWARE
Q ☐ Accounting
R. ☐ Spreadsheet
S. ☐ Personal Finance
T. ☐ Desktop Publishing
U. ☐ Word Processor
V. ☐ Database Manager
W. ☐ Graphics
X. ☐ Utility
Y. ☐ Communications
Z. ☐ Windows/Multi-tasking
1. ☐ Programming Language/ Compiler
2. ☐ Integrated/Multifunction
3. ☐ CAD

4. **From which of the following sources do you purchase personal computer products?** (Check all that apply)
   4 ☐ Specialty Computer Retail Stores 6 ☐ Direct from Manufacturers
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R. ☐ Spreadsheet
S. ☐ Personal Finance
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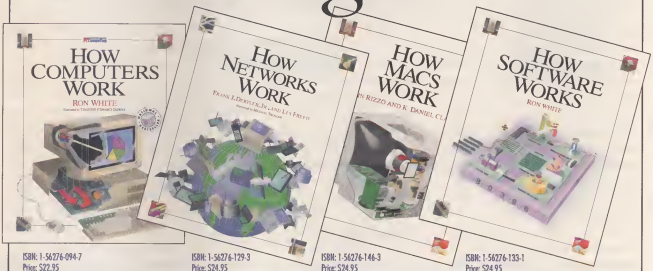

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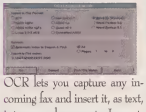

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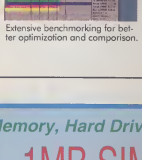
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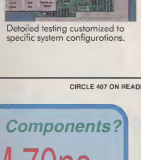
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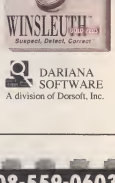

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64 X 4	$1 95	$2 25	$2 45	$2 95		
256X1 STATIC				$1 95	$2 25	
256 X 1	$1 05	$1 45	$1 90	$2 00	$2 05	$2 20
256 X 4			$4 45	$4 95	$5 45	$5 95
1MEG X 1			$3 50	$4 75	$5 45	$5 75
1MEGX1 STATIC				$4 95	$5 25	
1MEGX4				$17 00	$20 00	$24 00

CACHE MEMORY

	15ns	20ns	25ns
8KX8	4 95	4 45	3 95
32X8	8 95	7 75	
64x1	9 95	8 45	
64x4	9 95	8 95	7 95
16x4	8 95	5 45	4 95
128x8		49 00	39 00

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MODULE	1MEG	2MEG	3MEG	4MEG	5MEG	8MEG
Brother HL-8 8E, 8D, 8V	$99	$149		$249		
Canon LBP4 4 Lite & +	$128	$174				
Compaq Pagemark 15 & 20				$319		$638
Epson Action Laser II, 8000	$95		$163		$229	
Epson + 6000 and many more		$103		$168		
Fujitsu 7100 & 7200	$199	$279				
HP Deskjet 500 500C and 550C		$59 (256K)				
HP2, 2D		$89		$146		
3, 3D, 3P, 2P, 2P+		$103		$159		
HPIII Si	$50			$158		
HP Laser Jet 4 111Si XL300				$158		$298
IBM Laser 4019, 4019E (3 5MB)				$169		
IBM Laser 4029				$149		
NEC 90, 290		$118				
NEC 95		$98				
OKI 400		$99				
Packard Bell PB9500		$125		$178		
Panasonic 4410/4430		$119		$188		
Panasonic 4420/44501	$89	$118		$188		
Panasonic 4450	$105					
Panasonic 4455		$139				
QMS 410	$119	$159		$249		
Star LS04	$129	$179		$269		
StarScript 4	$128	$178		$258		
Tosiba Page Laser 6		$119		$178		
TI XL/PS17/PS35	$48					

Major Laptop & Notebook Memory

MODEL	MEMORY	PART#	PRICE
AT&T Safari	2MB	37650	$128
	4MB	37651	$238
Bondwell B 310	1MB	23050 09100	$128
Dec pc 320 Notebook	2MB Mod	FR PCIM-BA	$149
	4MB Mod	FR-PCIM-8B	$298
	8MB Mod	FR PCIM 8D	$345
Dell Laptop 212, 320N 320N+	1MB Mod	310-3203	$79
	2MB Mod	310 3204	$109
Dell 325N, NC, Notebook P C	2MB Mod	310 3210	$119
Dell NL20 & NL25 NTBK	2MB Mod	310 3213	$148
Epson NB-3 Notebook	4MB	A808511	$198
Epson NB SL/20,25	2MB Mod	A808771	$138
25C Notebook	4MB Mod	A808781	$228
Everex Tempo LX LX20	2MB	00160	$87
Everex Carrier	2MB	00263 00	$97
Grid 1500	4MB	52587	$198
Grid 1450SX	2MB	6200203	$148
Goldstar GS520, 386SX16	1MB	N/A	$98
	4MB	N/A	$248
NCR 3120 Notebook	4MB Mod	3120-K104	$299
NCR 3170 Notebook	4MB Mod	3123 K104	$399
Packard Bell, Magnavox, Mitsuba	1MB	N/A	$88
	4MB	N/A	$198
Panasonic CF170/270/370	1MB	CF-8A165	$64
Samsung Notemaster 386S	2MB	SNM002	$195
	4MB	SNM004	$395
Sanyo 17NB, 18NB & ZEOS	2MB	MBC NBMEM2	$88
Sharp 6220	1MB	CE 621B	$88
Sharp 6640	2MB	N/A	$198
Sharp 4700MZ 200	1MB	CE 471	$198
Sharp 8501 Colorstar	2MB	N/A	$398
TI Travelmate 2000	1MB	2568034-0011	$88
TI Travelmate 3000SX, WINSX	2MB	2566996 0001	$98
TI Travelmate 4000, WINDX/25 SX/16 SX25	4MB	2581265-001	$208
	16MB		$999

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AST Memory

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NOTEBOOK EXEC SX/25 SX/25C	4MB MOD	500814 004	$168
POWER EXEC 3/25SL, 3/25SL-C	4MB MOD	500984 001	$168
	16MB MOD		$1298
AST POWER EXEC L EL	2MB MOD	500984-004	$99
	4MB MOD	500984-001	$169
	8MB MOD	500984-002	$399
	16MB MOD	500984-003	$1245
POWER PREMIUM 486/50D	8MB EXP KIT	500780-001	$348
4/33 3/33 4/66D, PREMIUM II	16MB EXP KIT		$598
386/25 33 486/33 SX20	4 32 MB EXP BRD	500818 001	$348
AST PREMIUM 386C/386 16	4MB KIT	500510 008	$179
AST PREMIUM 386	4MB KIT	500510-004	$198
AST PREMIUM II, 386SX/16, 386SX/20, 486 37 & 33T	4MB MOD	500780-004	$168
BRAVO LC 425S, 4/33S, 4/50D, 4/66D	2MB KIT	500987-001	$98
	4MB MOD	500987 002	$168
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	4MB	07G1420	229.00
	8MB	07G1421	379.00
● PS/Note N45SL	2MB	92F8807	85.00
	2MB	92F8804	55.00
● PS/2 Model N51, M52, Notebook SLC, SX	2MB	07G1825	85.00
	4MB	07G1827	149.00
	8MB	07G1828	299.00
● Laptop N33SX	2MB	79F0999	85.00
	4MB	79F1000	139.00
● L40SX	8MB	79F1001	279.00

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● PS2 70s and 80s Expansion Bd	2-8MB	64G6005	239.00
	2-16MB	34H3977	279.00
	4-16MB	34H3011	379.00
	4MB	64G6060	189.00
● PS/2 30/286, Adpt Bd 149725?	512K	30F5348	34.00
● PS/2 30/286, 25/286, Adpt Bd 149725?	2MB	30F5360	85.00
● PS2 50, 50Z, 55SX, 60, 65SX	2-8MB	149725?	249.00
	2-16MB	64G6009	299.00
● PS2 70-421, A61, B21, B61, PS/1 Consultant, Essential & Expert models x11, x13 & x14, PS/Valuepoint Cxx series	2MB	64G6004	76.00
	2MB	64G6008	76.00
● PS/2 35SX, L5, 40SX, 55SX, L5, 65SX, L5, X5Station, PS/Valuepoint Cxx series & adapter board 34F3031 or 34F3077	4MB	34F2933	145.00
● PS/2 80 XP, 95 XP, P75 (Paris) 56, 57, (all) PS/1 Pro 2133	2MB	64G6002	79.00
	4MB	87F9977	145.00
● PS2 90, 95 XP, P75 (Paris) 56, 57, (all) PS/1 Consultant, Essential, Expert x11, x13 & x14, PS/1 Pro 2133, P55/6000	4MB	64G0128	145.00
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MXF210A	*Maxtor*	*210MB*	*15MS*	*329.00*
WD-AC2220	Western Digital	220MB	15MS	319.00
MX240A	Maxtor	240MB	11MS	349.00
LXT340A	Maxtor	340MB	13MS	599.00
WD-AC2310	Western Digital	340MB	13MS	515.00
LXT535A	Maxtor	535MB	13MS	639.00

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Part #	Brand	Capacity	Speed	Price
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MXZ210S	Maxtor	210MB	14MS	429.00
LXT340S	Maxtor	340MB	13MS	899.00
LXT840S	Maxtor	540MB	9MS	1699.00
MK340FB (SCSI 2 FAST)	Toshiba	317MB	11.5MS	999.00
MK535FB (SCSI 2 FAST)	Toshiba	512MB	11MS	1249.00

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1MBX3	29.00	34.00	36.00	41.00
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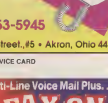

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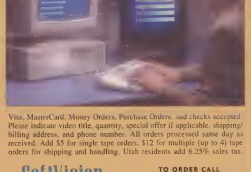

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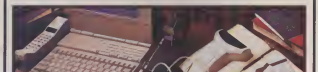

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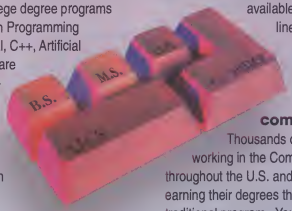

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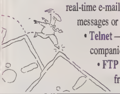

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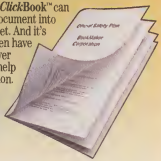

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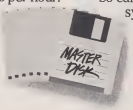

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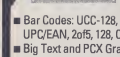

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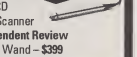

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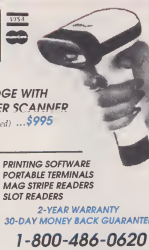

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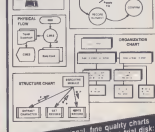

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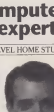

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I WENT TO a trendy showbiz restaurant in New York with my editor, an executive editor, and *the* editor of *PC/Computing*. With Robert Altman and Lee Grant at the next table, my dinner companions pulled out graphs. I was eating and they were making like Perot. Their graphs recorded the percentage of subscribers who read "most of" my column on the x-axis and what percentage of "enjoyment" they averaged on the y-axis. They had plotted what interviewers with clipboards had found when grilling subscribers who were trying to enjoy a magazine.

My graph points splattered all over hell. I wasn't "clustering." They were worried—I have too much monthly variation. Dvorak's columns were right on top of each other, kinda one big dot. About the same percent read about the same and enjoy about the same of John every month. (If you get picked for a survey, I've got $20 for you if you can move Dvorak's cluster to the lower left quadrant.)

Robert Morton, Letterman's producer, stopped by our table and told us some really cool superinside Dave information, but I can't tell you because the bosses suggested I keep the columns about computers. At least Morty didn't catch me looking at graphs.

They said my most successful columns had dealt with subjects the reader "could relate to," ideas that "got the reader involved." They were thinking about doing a free Penn screen saver with subscriptions—blood dripping over the screen. I was thinking of Uma Thurman.

I got another idea. Screen savers are peaceful: winged toasters, starry skylines, fish—electronic wallpaper. But what if when you didn't touch your computer for x minutes, it got needy and desperate? What if a person jacked into the network or a modem, or were living inside the computer—a knowledgeable, lonely entity typing 80 words a minute?

The screen saver starts typing wildly, "Logging on: Is anyone there? Could you believe the op-ed today? What about the First Amendment?" Then it types the First Amendment. And the Fifth . . . backspacing and correcting mistakes. It mentions Shakespeare and quotes a complete sonnet, adding intelligent commentary. "Want to talk about Siberia?" A few K on Siberia. "Sex?" We got flirtations with, by, to, and for every natural or nurtured persuasion. Text spewing over the screen with no margins, on every subject, changing colors, fonts, and formats, never repeating, relentless.

Touch a key to try to answer or freeze it or go backward, and it's gone. When it starts up again, it's all different. There's no turning back.

The text should be compressed and encrypted, in modules that pop up at random. I'll write the connecting links. Programmers will decide how to randomize the colors and formats, but we'll need different personalities on lots of subjects. We need megs. So send us your ASCII, jokes, love letters, anything in any language. Distract people, keep them from working, engross them in a screen saver. Drive them nutty.

It'll take a while, but someday, maybe when you renew your subscription, you'll get "The Lonely Penn Jillette Screen Saver." At some point, text you wrote will swirl by. (With your luck, it'll be in the middle of the night in your empty office.)

Keep your text PG (they're crybabies here), don't quote anything copyrighted, and send your disks to the magazine. It all becomes our property. We'll even keep the disk.

Programmers write the code. You guys send the text. I get the credit.

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